



BGU8009

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

Rev. 5 — 5 April 2016

Product data sheet

1. General description

The BGU8009 is a Low-Noise Amplifier (LNA) for GNSS receiver applications, 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
- Noise figure = 0.65 dB
- Gain 18 dB
- High input 1 dB compression point of -7 dBm
- High out of band IP_{3i} of 6 dBm
- Supply voltage 1.5 V to 3.1 V
- Optimized performance at very low supply current of 4.2 mA
- Power-down mode current consumption < 1 μ A
- 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 \times 0.9 mm \times 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

4. Quick reference data

Table 1. Quick reference data

$f = 1575$ MHz; $V_{CC} = 2.85$ V; $P_i < -40$ dBm; $T_{amb} = 25$ °C; input matched to 50Ω 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	$V_{I(ENABLE)} \geq 0.8$ 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 [2]	-	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
IP _{3i}	input third-order intercept point	$V_{CC} = 1.8$ V [3]	-	3	-	dBm
		$V_{CC} = 2.85$ V [3]	-	6	-	dBm

[1] PCB losses are subtracted.

[2] Including PCB losses.

[3] $f_1 = 1713$ MHz; $f_2 = 1851$ MHz; $P_i = -20$ dBm per carrier.

5. Ordering information

Table 2. Ordering information

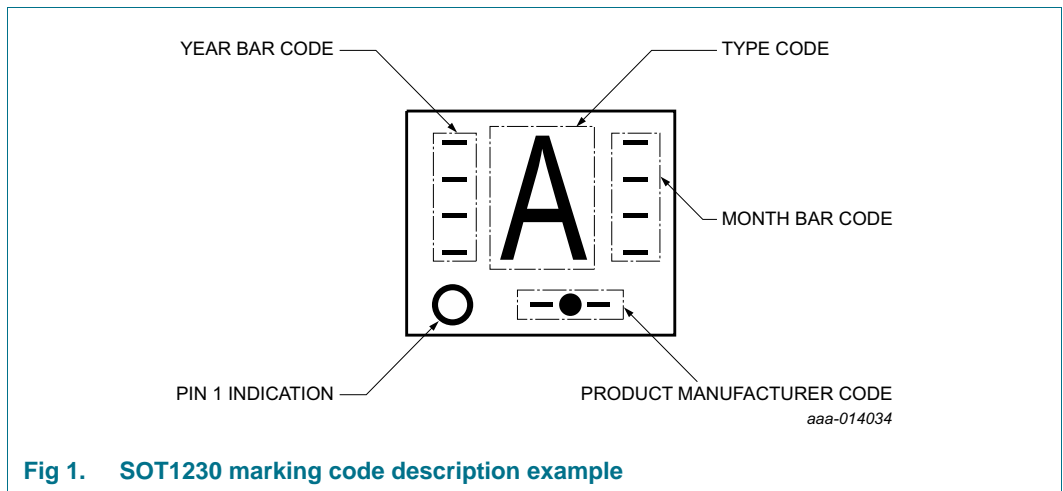
Type number	Package		
	Name	Description	Version
BGU8009	XSON6	plastic very thin small outline package; no leads; 6 terminals; body $1.1 \times 0.9 \times 0.47$ mm	SOT1230
OM7820	EVB	BGU8009 evaluation board, MMIC only	-
OM7824	EVB	BGU8009 evaluation board, front-end EVB	-

6. Marking

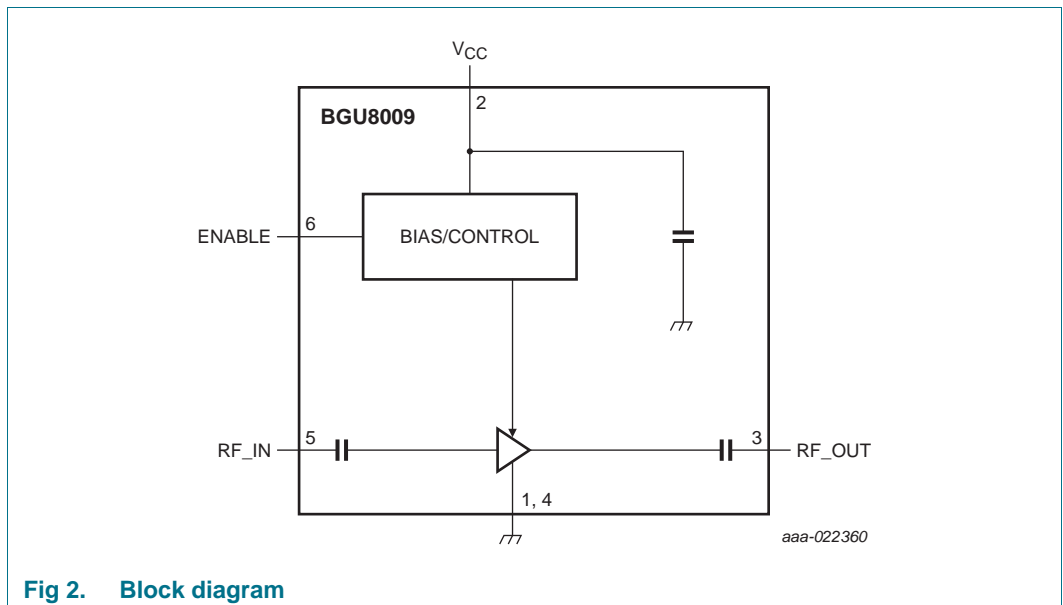
Table 3. Marking codes

Type number	Marking code
BGU8009	A

6.1 Marking code description

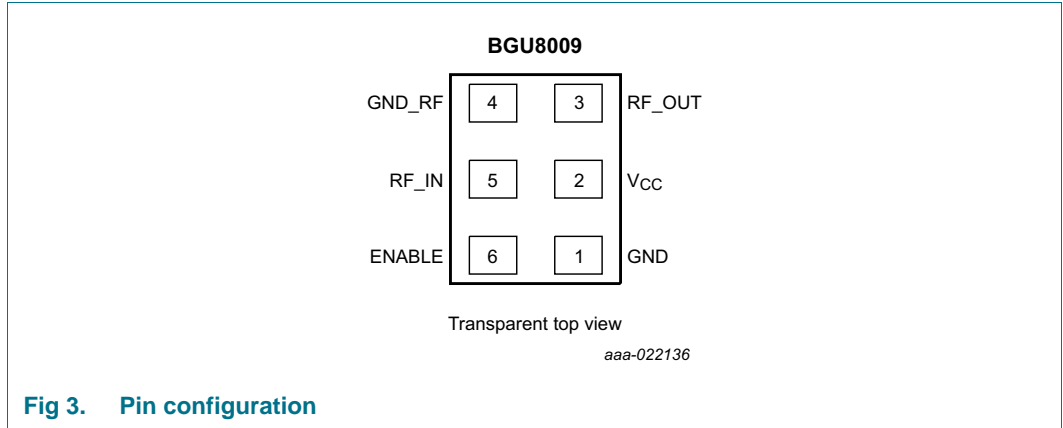


7. Block diagram



8. Pinning information

8.1 Pinning



8.2 Pin description

Table 4. 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 5. 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
P _{tot}	total power dissipation	T _{sp} ≤ 130 °C	-	55	mW
T _{stg}	storage temperature		-65	+150	°C

Table 5. Limiting values ...continued

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
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 $V_{CC} + 0.6\text{ V}$ 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 6. 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 7. Thermal characteristics

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

12. Characteristics

Table 8. Characteristics at $V_{CC} = 1.8\text{ V}$

$f = 1575\text{ MHz}$, $V_{CC} = 1.8\text{ V}$, $V_{I(ENABLE)} \geq 0.8\text{ V}$, $P_i < -40\text{ dBm}$ and $T_{amb} = 25\text{ °C}$. Input matched to $50\ \Omega$ using a 5.6 nH inductor, see [Figure 34](#), unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CC}	supply current	$V_{I(ENABLE)} \geq 0.8\text{ V}$				
		$P_i < -40\text{ dBm}$	2.3	4.2	6.2	mA
		$P_i = -20\text{ dBm}$	-	9	-	mA
		$V_{I(ENABLE)} \leq 0.3\text{ V}$	-	-	1	µA
G_p	power gain	no jammer	16	17.6	20	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 850\text{ MHz}$	-	19.8	-	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 1850\text{ MHz}$	-	20.0	-	dB
RL_{in}	input return loss	$P_i < -40\text{ dBm}$	-	9	-	dB
		$P_i = -20\text{ dBm}$	-	11	-	dB

Table 8. Characteristics at $V_{CC} = 1.8\text{ V}$...continued

$f = 1575\text{ MHz}$, $V_{CC} = 1.8\text{ V}$, $V_{I(ENABLE)} \geq 0.8\text{ V}$, $P_i < -40\text{ dBm}$ and $T_{amb} = 25\text{ }^\circ\text{C}$. Input matched to $50\ \Omega$ using a 5.6 nH inductor, see [Figure 34](#), unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RL _{out}	output return loss	$P_i < -40\text{ dBm}$	-	15	-	dB
		$P_i = -20\text{ dBm}$	-	15	-	dB
ISL	isolation		-	37	-	dB
NF	noise figure	$P_i = -40\text{ dBm}$; no jammer [1][2]	-	0.65	1.2	dB
		$P_i = -40\text{ dBm}$; no jammer [2][3]	-	0.70	1.25	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 850\text{ MHz}$ [3]	-	0.9	-	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 1850\text{ MHz}$ [3]	-	1.2	-	dB
P _{i(1dB)}	input power at 1 dB gain compression		-	-10	-	dBm
IP _{3i}	input third-order intercept point	[4]	-	3	-	dBm
		[5]	-	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] PCB losses are subtracted.

[2] Guaranteed by device design; not tested in production.

[3] Including PCB losses.

[4] $f_1 = 1713\text{ MHz}$; $f_2 = 1851\text{ MHz}$, $P_i = -20\text{ dBm}$ per carrier.

[5] $f_1 = 1713\text{ MHz}$; $f_2 = 1851\text{ MHz}$, $P_{i(1)} = -20\text{ dBm}$, $P_{i(2)} = -65\text{ dBm}$.

Table 9. Characteristics at $V_{CC} = 2.85\text{ V}$

$f = 1575\text{ MHz}$, $V_{CC} = 2.85\text{ V}$, $V_{I(ENABLE)} \geq 0.8\text{ V}$, $P_i < -40\text{ dBm}$ and $T_{amb} = 25\text{ }^\circ\text{C}$. Input matched to $50\ \Omega$ using a 5.6 nH inductor, see [Figure 34](#), unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CC}	supply current	$V_{I(ENABLE)} \geq 0.8\text{ V}$				
		$P_i < -40\text{ dBm}$	2.6	4.4	6.5	mA
		$P_i = -20\text{ dBm}$	-	9	-	mA
		$V_{I(ENABLE)} \leq 0.3\text{ V}$	-	-	1	μA
G _p	power gain	no jammer	16	17.8	20	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 850\text{ MHz}$	-	20.0	-	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 1850\text{ MHz}$	-	20.2	-	dB
RL _{in}	input return loss	$P_i < -40\text{ dBm}$	-	9	-	dB
		$P_i = -20\text{ dBm}$	-	11	-	dB
RL _{out}	output return loss	$P_i < -40\text{ dBm}$	-	15	-	dB
		$P_i = -20\text{ dBm}$	-	15	-	dB
ISL	isolation		-	37	-	dB

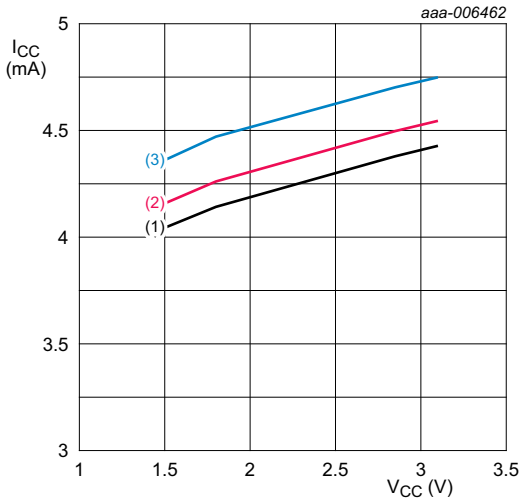
Table 9. Characteristics at $V_{CC} = 2.85\text{ V}$...continued

$f = 1575\text{ MHz}$, $V_{CC} = 2.85\text{ V}$, $V_{I(ENABLE)} \geq 0.8\text{ V}$, $P_i < -40\text{ dBm}$ and $T_{amb} = 25\text{ }^\circ\text{C}$. Input matched to $50\text{ }\Omega$ using a 5.6 nH inductor, see [Figure 34](#), unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
NF	noise figure	$P_i = -40\text{ dBm}$; no jammer [1][2]	-	0.65	1.2	dB
		$P_i = -40\text{ dBm}$; no jammer [2][3]	-	0.70	1.25	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 850\text{ MHz}$ [3]	-	0.9	-	dB
		$P_{jam} = -20\text{ dBm}$; $f_{jam} = 1850\text{ MHz}$ [3]	-	1.2	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	[2]	-12.5	-7	-	dBm
IP3 _i	input third-order intercept point	[2][4]	0	6	-	dBm
		[2][5]	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

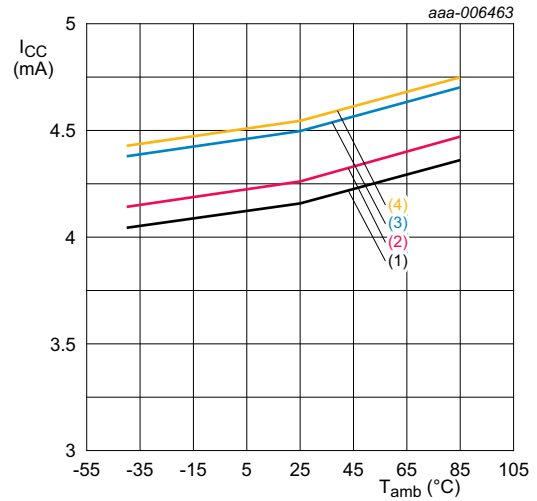
- [1] PCB losses are subtracted.
- [2] Guaranteed by device design; not tested in production.
- [3] Including PCB losses.
- [4] $f_1 = 1713\text{ MHz}$; $f_2 = 1851\text{ MHz}$, $P_i = -20\text{ dBm}$ per carrier.
- [5] $f_1 = 1713\text{ MHz}$; $f_2 = 1851\text{ MHz}$, $P_{i(1)} = -20\text{ dBm}$, $P_{i(2)}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

13. Graphs



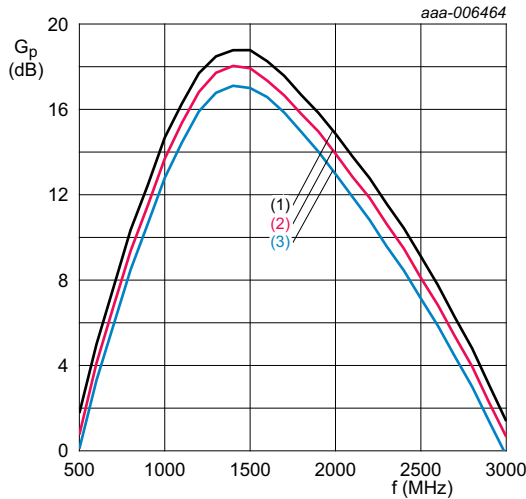
$P_i = -45$ dBm.
 (1) $T_{amb} = -40$ °C
 (2) $T_{amb} = +25$ °C
 (3) $T_{amb} = +85$ °C

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



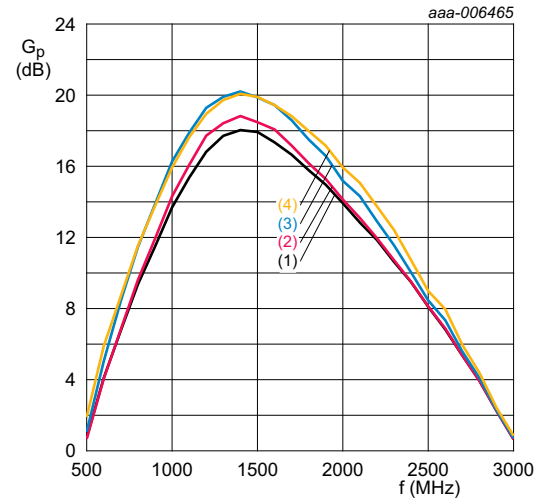
$P_i = -45$ dBm.
 (1) $V_{CC} = 1.5$ V
 (2) $V_{CC} = 1.8$ V
 (3) $V_{CC} = 2.85$ V
 (4) $V_{CC} = 3.1$ V

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



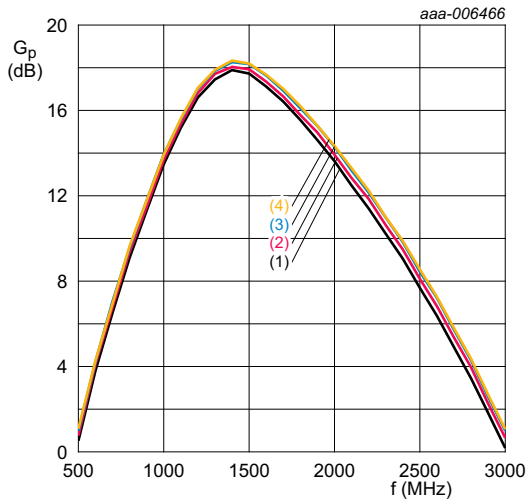
$P_i = -45$ dBm; $V_{CC} = 1.8$ V.
 (1) $T_{amb} = -40$ °C
 (2) $T_{amb} = +25$ °C
 (3) $T_{amb} = +85$ °C

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



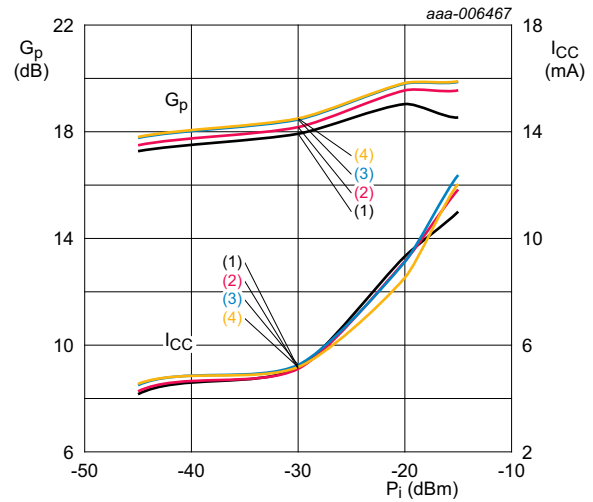
$T_{amb} = 25$ °C; $V_{CC} = 1.8$ V.
 (1) $P_i = -45$ dBm
 (2) $P_i = -30$ dBm
 (3) $P_i = -20$ dBm
 (4) $P_i = -15$ dBm

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



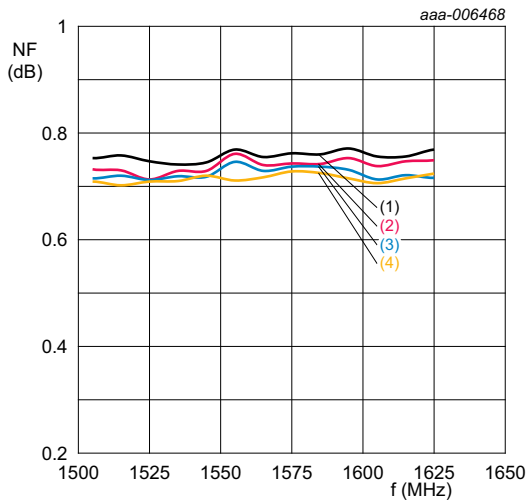
$P_i = -45$ dBm; $T_{amb} = 25$ °C.
 (1) $V_{CC} = 1.5$ V
 (2) $V_{CC} = 1.8$ V
 (3) $V_{CC} = 2.85$ V
 (4) $V_{CC} = 3.1$ V

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



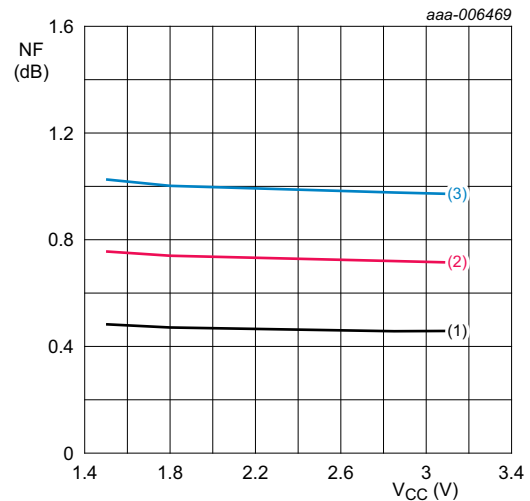
$f = 1575$ MHz; $T_{amb} = 25$ °C.
 (1) $V_{CC} = 1.5$ V
 (2) $V_{CC} = 1.8$ V
 (3) $V_{CC} = 2.85$ V
 (4) $V_{CC} = 3.1$ V

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



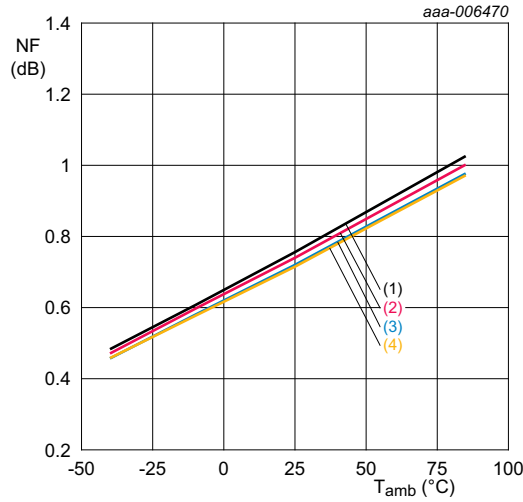
$T_{amb} = 25$ °C; no jammer, including PCB losses.
 (1) $V_{CC} = 1.5$ V
 (2) $V_{CC} = 1.8$ V
 (3) $V_{CC} = 2.85$ V
 (4) $V_{CC} = 3.1$ V

Fig 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

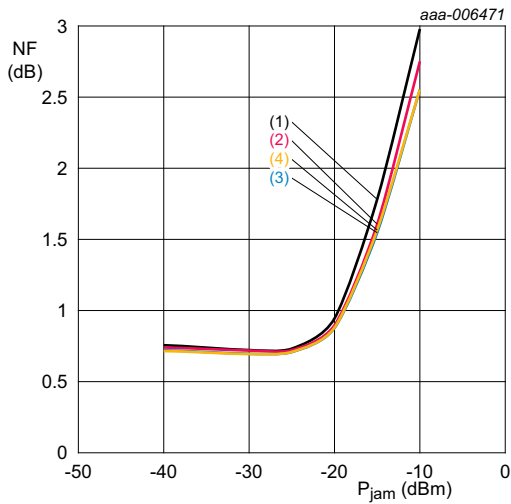
Fig 11. Noise figure as a function of supply voltage; typical values



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

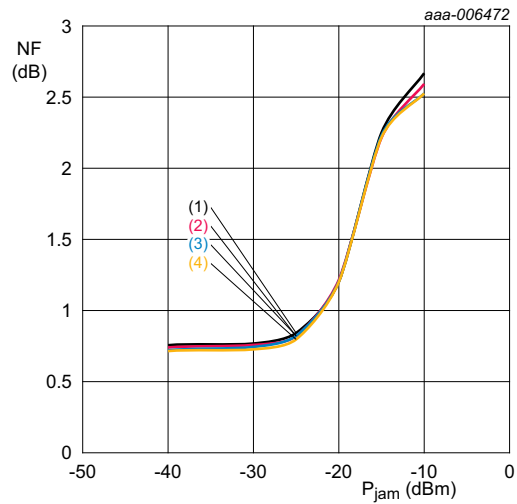
Fig 12. Noise figure as a function of ambient temperature; typical values



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

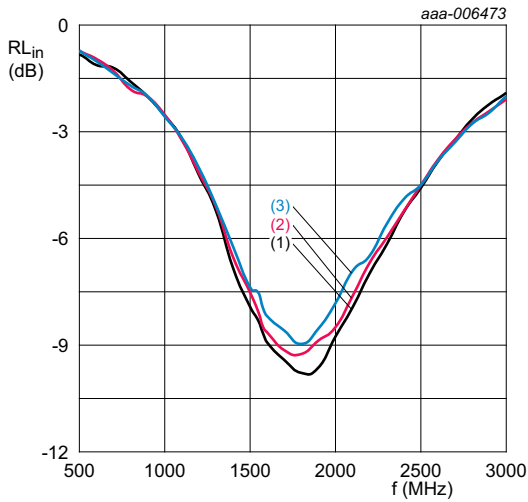
Fig 13. Noise figure as a function of jamming power; typical values



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

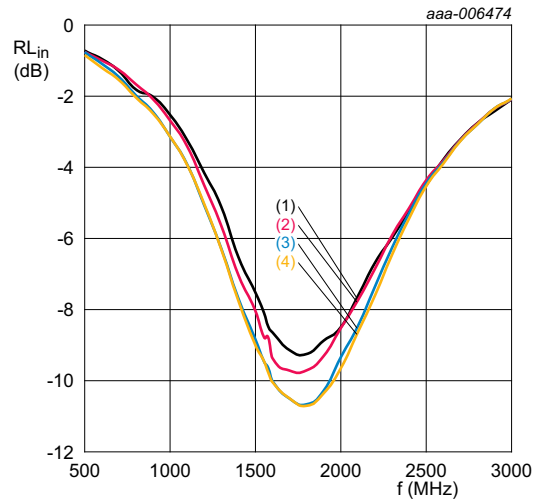
- (1) V_{CC} = 1.5 V
- (2) V_{CC} = 1.8 V
- (3) V_{CC} = 2.85 V
- (4) V_{CC} = 3.1 V

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



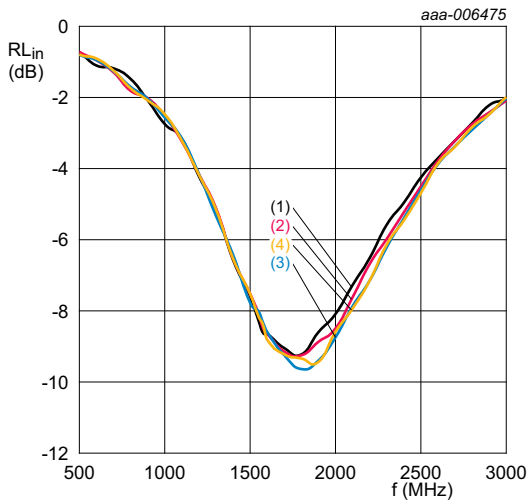
$P_i = -45 \text{ dBm}; V_{CC} = 1.8 \text{ V}.$
 (1) $T_{amb} = -40 \text{ }^\circ\text{C}$
 (2) $T_{amb} = +25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = +85 \text{ }^\circ\text{C}$

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



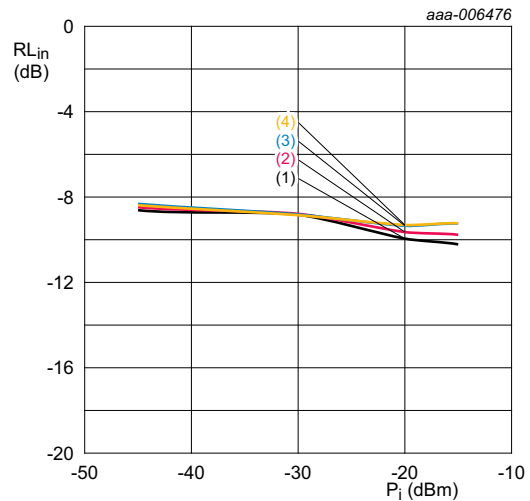
$T_{amb} = 25 \text{ }^\circ\text{C}; V_{CC} = 1.8 \text{ V}.$
 (1) $P_i = -45 \text{ dBm}$
 (2) $P_i = -30 \text{ dBm}$
 (3) $P_i = -20 \text{ dBm}$
 (4) $P_i = -15 \text{ dBm}$

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



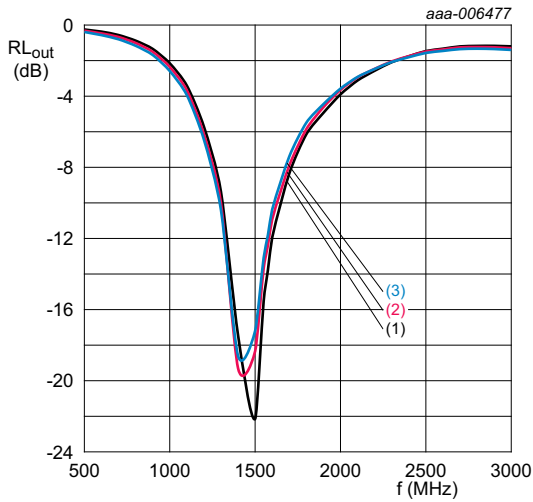
$P_i = -45 \text{ dBm}; T_{amb} = 25 \text{ }^\circ\text{C}.$
 (1) $V_{CC} = 1.5 \text{ V}$
 (2) $V_{CC} = 1.8 \text{ V}$
 (3) $V_{CC} = 2.85 \text{ V}$
 (4) $V_{CC} = 3.1 \text{ V}$

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



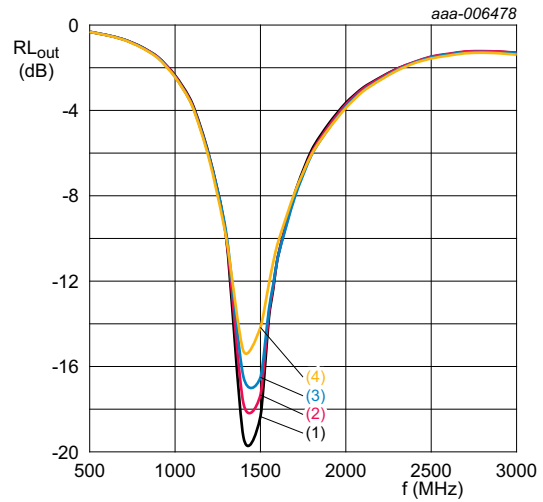
$f = 1575 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}.$
 (1) $V_{CC} = 1.5 \text{ V}$
 (2) $V_{CC} = 1.8 \text{ V}$
 (3) $V_{CC} = 2.85 \text{ V}$
 (4) $V_{CC} = 3.1 \text{ V}$

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



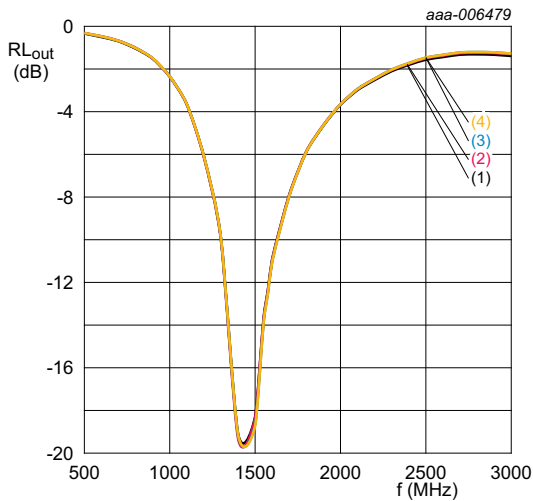
$P_i = -45 \text{ dBm}; V_{CC} = 1.8 \text{ V}.$
 (1) $T_{amb} = -40 \text{ }^\circ\text{C}$
 (2) $T_{amb} = +25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = +85 \text{ }^\circ\text{C}$

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



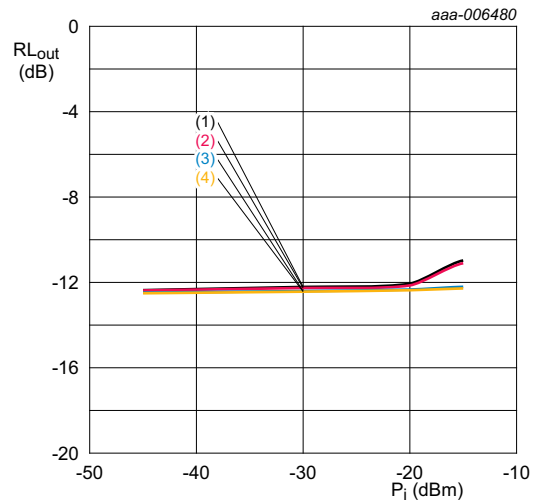
$T_{amb} = 25 \text{ }^\circ\text{C}; V_{CC} = 1.8 \text{ V}.$
 (1) $P_i = -45 \text{ dBm}$
 (2) $P_i = -30 \text{ dBm}$
 (3) $P_i = -20 \text{ dBm}$
 (4) $P_i = -15 \text{ dBm}$

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



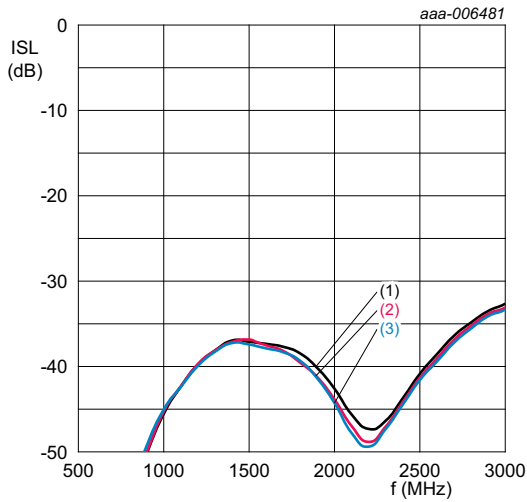
$P_i = -45 \text{ dBm}; T_{amb} = 25 \text{ }^\circ\text{C}.$
 (1) $V_{CC} = 1.5 \text{ V}$
 (2) $V_{CC} = 1.8 \text{ V}$
 (3) $V_{CC} = 2.85 \text{ V}$
 (4) $V_{CC} = 3.1 \text{ V}$

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



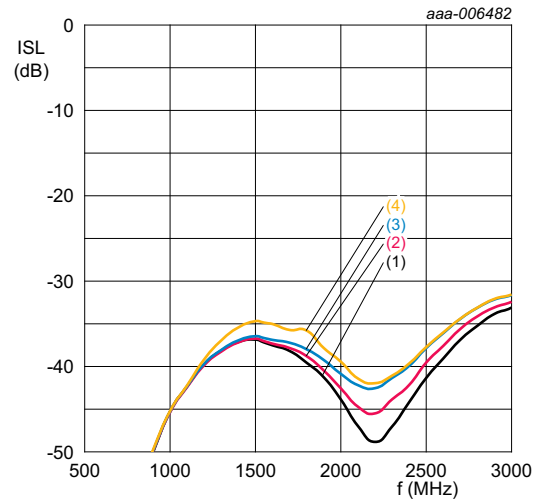
$f = 1575 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}.$
 (1) $V_{CC} = 1.5 \text{ V}$
 (2) $V_{CC} = 1.8 \text{ V}$
 (3) $V_{CC} = 2.85 \text{ V}$
 (4) $V_{CC} = 3.1 \text{ V}$

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



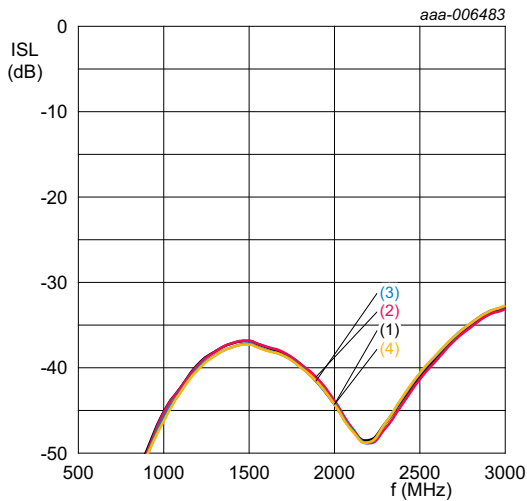
$P_i = -45 \text{ dBm}; V_{CC} = 1.8 \text{ V}.$
 (1) $T_{amb} = -40 \text{ }^\circ\text{C}$
 (2) $T_{amb} = +25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = +85 \text{ }^\circ\text{C}$

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



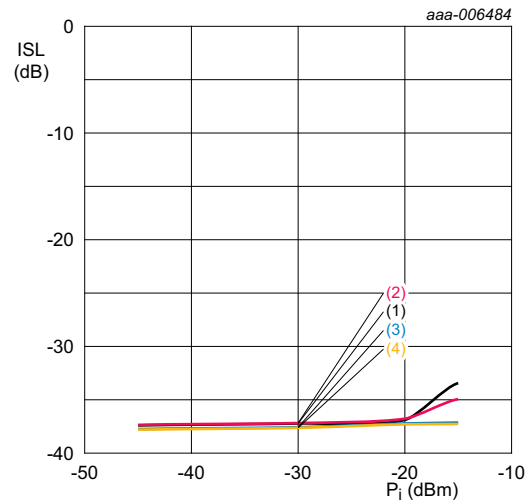
$T_{amb} = 25 \text{ }^\circ\text{C}; V_{CC} = 1.8 \text{ V}.$
 (1) $P_i = -45 \text{ dBm}$
 (2) $P_i = -30 \text{ dBm}$
 (3) $P_i = -20 \text{ dBm}$
 (4) $P_i = -15 \text{ dBm}$

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



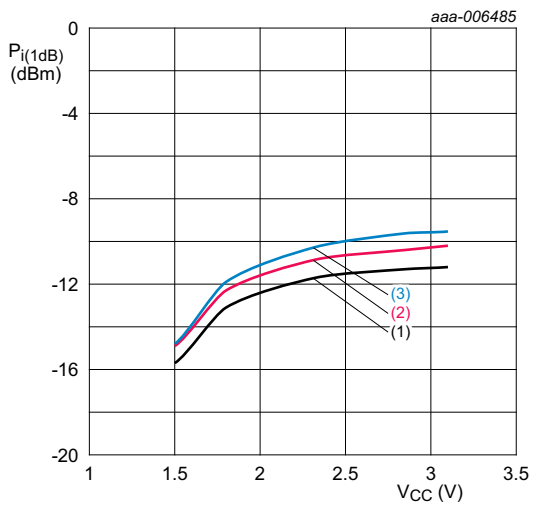
$P_i = -45 \text{ dBm}; T_{amb} = 25 \text{ }^\circ\text{C}.$
 (1) $V_{CC} = 1.5 \text{ V}$
 (2) $V_{CC} = 1.8 \text{ V}$
 (3) $V_{CC} = 2.85 \text{ V}$
 (4) $V_{CC} = 3.1 \text{ V}$

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



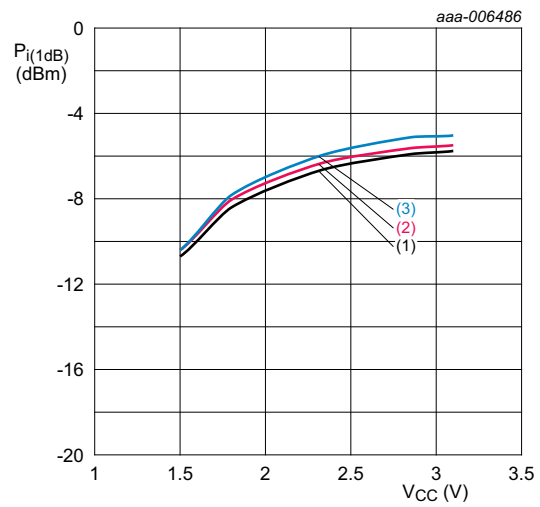
$f = 1575 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}.$
 (1) $V_{CC} = 1.5 \text{ V}$
 (2) $V_{CC} = 1.8 \text{ V}$
 (3) $V_{CC} = 2.85 \text{ V}$
 (4) $V_{CC} = 3.1 \text{ V}$

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



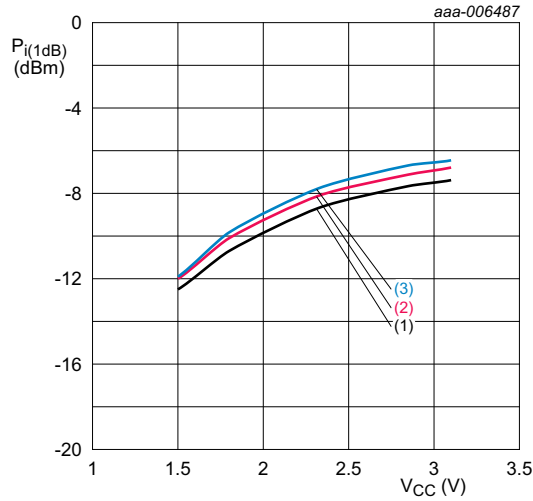
- f = 850 MHz.
- (1) T_{amb} = -40 °C
 - (2) T_{amb} = +25 °C
 - (3) T_{amb} = +85 °C

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



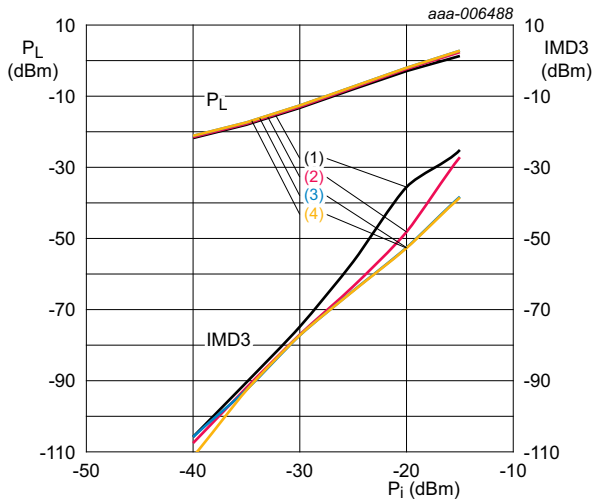
- f = 1850 MHz.
- (1) T_{amb} = -40 °C
 - (2) T_{amb} = +25 °C
 - (3) T_{amb} = +85 °C

Fig 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

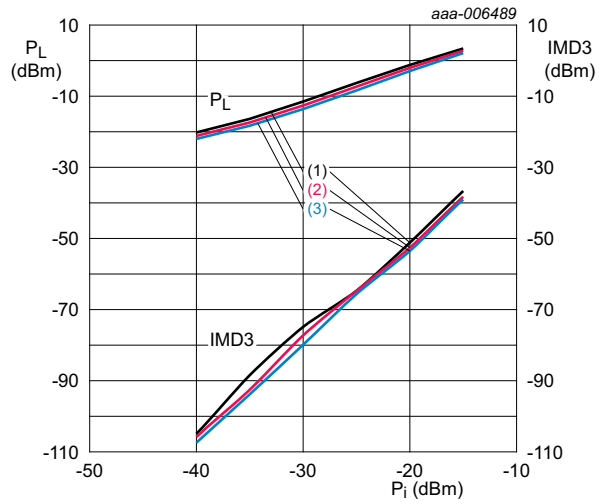
Fig 29. Input power at 1 dB gain compression as a function of supply voltage; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}$; $f = 1575\text{ MHz}$; $f_1 = 1713\text{ MHz}$; $f_2 = 1851\text{ MHz}$; P_i per carrier.

- (1) $V_{CC} = 1.5\text{ V}$
- (2) $V_{CC} = 1.8\text{ V}$
- (3) $V_{CC} = 2.85\text{ V}$
- (4) $V_{CC} = 3.1\text{ V}$

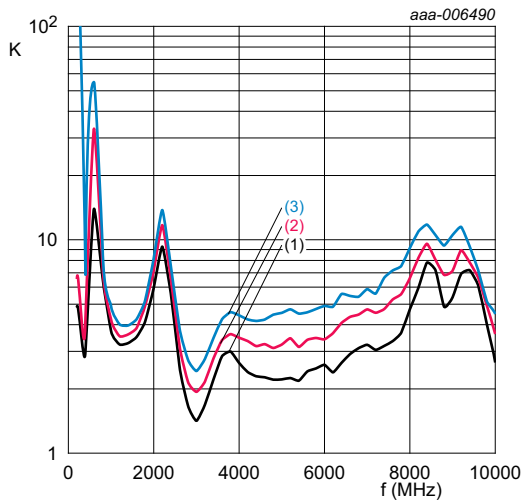
Fig 30. Output power and third order intermodulation distortion as function of input power; typical values



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

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

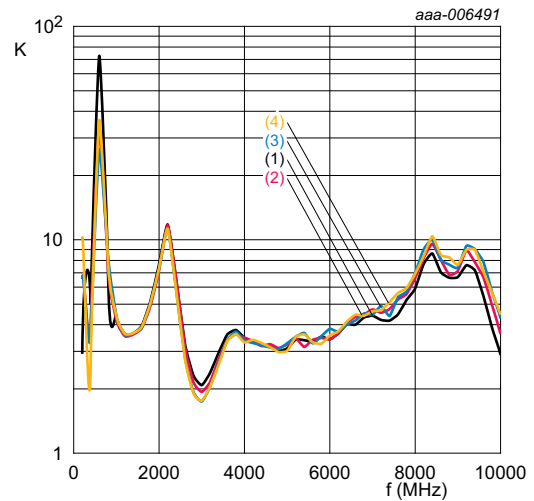
Fig 31. Output power and third order intermodulation distortion as function of input power; typical values



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

- (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. Rollett stability factor as a function of frequency; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}$; $P_i = -45\text{ dBm}$.

- (1) $V_{CC} = 1.5\text{ V}$
- (2) $V_{CC} = 1.8\text{ V}$
- (3) $V_{CC} = 2.85\text{ V}$
- (4) $V_{CC} = 3.1\text{ V}$

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

14. Application information

14.1 GNSS LNA

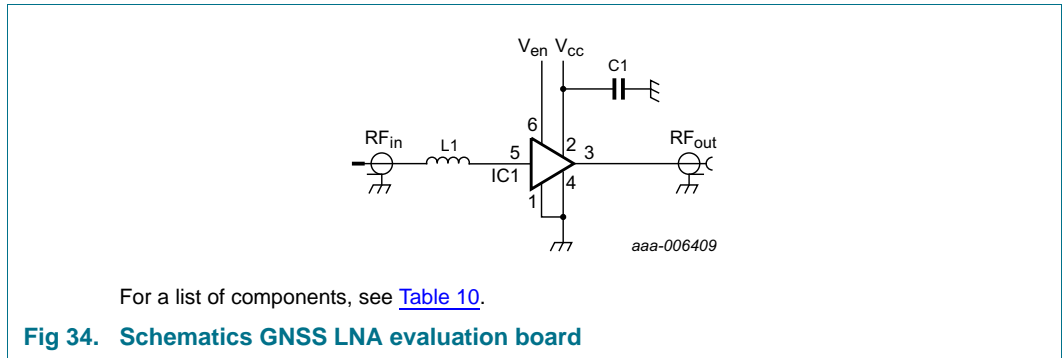


Table 10. List of components for [Figure 34](#)

Component	Description	Value	Remarks
C1	decoupling capacitor	1 nF	
IC1	BGU8009	-	NXP Semiconductors
L1	high-quality matching inductor	5.6 nH	Murata LQW15A

See application note AN11288 for details.

15. Package outline

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

SOT1230

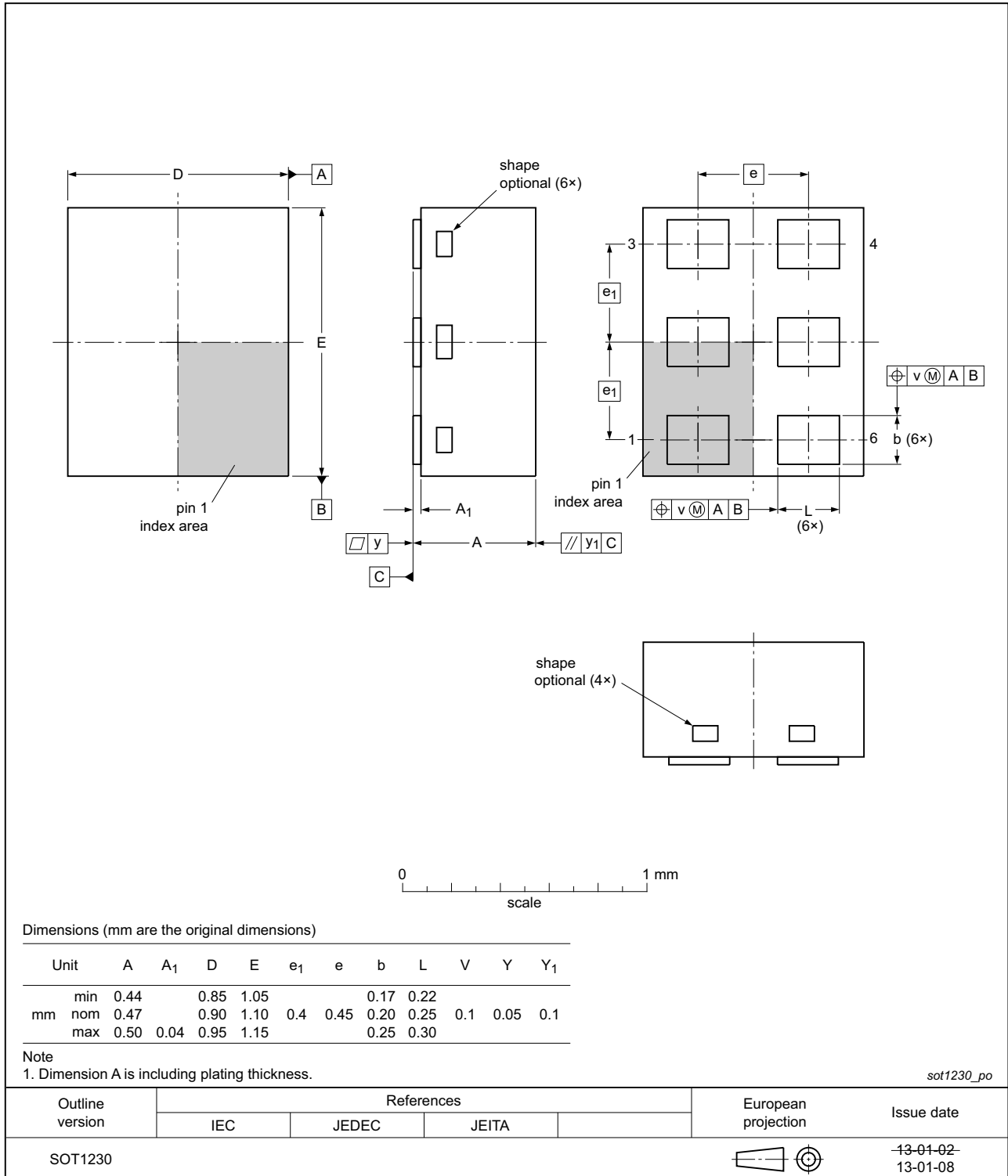


Fig 35. Package outline SOT1230 (XSON6)

16. 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.

17. Abbreviations

Table 11. 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

18. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU8009 v.5	20160405	Product data sheet	-	BGU8009 v.4
Modifications:	<ul style="list-style-type: none"> updated Figure 2 "Block diagram" on page 3 			
BGU8009 v.4	20160316	Product data sheet	-	BGU8009 v.3
Modifications:	<ul style="list-style-type: none"> updated Table 8 on page 5 and Table 9 on page 6 			
BGU8009 v.3	20141001	Product data sheet	-	BGU8009 v.2
Modifications:	<ul style="list-style-type: none"> 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	-	-

19. Legal information

19.1 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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