



# BGU8009

SiGe:C Low Noise Amplifier MMIC for GPS, GLONASS, Galileo and Compass

Rev. 1 — 1 February 2013

Product data sheet

## 1. Product profile

### 1.1 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.

#### CAUTION



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

### 1.2 Features and benefits

- Covers full GNSS L1 band, from 1559 MHz to 1610 MHz
- Noise figure (NF) = 0.65 dB
- Gain 18 dB
- High input 1 dB compression point of  $-7$  dBm
- High out of band IP<sub>3i</sub> 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  $< 1$   $\mu$ 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 of 1



1.3 Applications

- LNA for GPS, GLONASS, Galileo and Compass (BeiDou) in smart phones, feature phones, tablet, digital still cameras, digital video cameras, RF front-end modules, complete GNSS modules and personal health applications.

1.4 Quick reference data

Table 1. Quick reference data

$f = 1575 \text{ MHz}$ ;  $V_{CC} = 2.85 \text{ V}$ ;  $P_i < -40 \text{ dBm}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ ; input matched to  $50 \text{ } \Omega$  using a  $5.6 \text{ nH}$  inductor, see [Figure 1](#); unless otherwise specified.

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

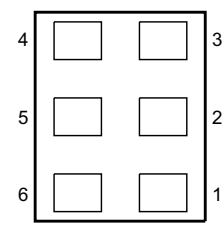
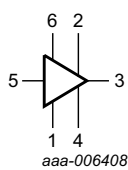
[1] PCB losses are subtracted.

[2] Including PCB losses.

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

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	GND		
2	$V_{CC}$		
3	RF_OUT		
4	GND_RF		
5	RF_IN		
6	ENABLE		

Transparent top view

### 3. 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 × 0.9 × 0.47 mm	SOT1230
OM7820	EVB	BGU8009 evaluation board, MMIC only	-
OM7824	EVB	BGU8009 evaluation board, front-end EVB	-

### 4. Marking

Table 4. Marking codes

Type number	Marking code
BGU8009	A

### 5. 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	$T_{sp} \leq 130$ °C	-	55	mW
$T_{stg}$	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 1](#).

[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 in order to avoid excess current.

[3] The RF input and RF output are AC coupled through internal DC blocking capacitors.

## 6. 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

## 7. 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

## 8. Characteristics

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

$f = 1575$  MHz;  $V_{CC} = 1.8$  V;  $V_{I(ENABLE)} \geq 0.8$  V;  $P_i < -40$  dBm;  $T_{amb} = 25$  °C; input matched to 50  $\Omega$  using a 5.6 nH inductor, see [Figure 1](#); unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{CC}$	supply current	$V_{I(ENABLE)} \geq 0.8$ V					
		$P_i < -40$ dBm	-	4.2	-	mA	
		$P_i = -20$ dBm	-	9	-	mA	
		$V_{I(ENABLE)} \leq 0.3$ V	-	-	1	$\mu$ A	
$G_p$	power gain	no jammer	-	17.6	-	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	-	dB
		$P_i = -40$ dBm, no jammer	[2]	-	0.70	-	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		-	-10	-	dBm	

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

$f = 1575\text{ MHz}$ ;  $V_{CC} = 1.8\text{ V}$ ;  $V_{I(ENABLE)} \geq 0.8\text{ V}$ ;  $P_i < -40\text{ dBm}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ ; input matched to  $50\text{ }\Omega$  using a  $5.6\text{ nH}$  inductor, see [Figure 1](#); unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
IP <sub>3i</sub>	input third-order intercept point		[3]	-	3	-	dBm
			[4]	-	3	-	dBm
t <sub>on</sub>	turn-on time	time from V <sub>I(ENABLE)</sub> ON, to 90 % of the gain	-	-	2	μs	
t <sub>off</sub>	turn-off time	time from V <sub>I(ENABLE)</sub> OFF, to 10 % of the gain	-	-	1	μs	

[1] PCB losses are subtracted

[2] Including PCB losses

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

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

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

$f = 1575\text{ MHz}$ ;  $V_{CC} = 2.85\text{ V}$ ;  $V_{I(ENABLE)} \geq 0.8\text{ V}$ ;  $P_i < -40\text{ dBm}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ ; input matched to  $50\text{ }\Omega$  using a  $5.6\text{ nH}$  inductor, see [Figure 1](#); unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I <sub>CC</sub>	supply current	V <sub>I(ENABLE)</sub> ≥ 0.8 V					
		P <sub>i</sub> < -40 dBm	-	4.4	-	mA	
		P <sub>i</sub> = -20 dBm	-	9	-	mA	
		V <sub>I(ENABLE)</sub> ≤ 0.3 V	-	-	1	μA	
G <sub>p</sub>	power gain	no jammer	-	17.8	-	dB	
		P <sub>jam</sub> = -20 dBm; f <sub>jam</sub> = 850 MHz	-	20.0	-	dB	
		P <sub>jam</sub> = -20 dBm; f <sub>jam</sub> = 1850 MHz	-	20.2	-	dB	
RL <sub>in</sub>	input return loss	P <sub>i</sub> < -40 dBm	-	9	-	dB	
		P <sub>i</sub> = -20 dBm	-	11	-	dB	
RL <sub>out</sub>	output return loss	P <sub>i</sub> < -40 dBm	-	15	-	dB	
		P <sub>i</sub> = -20 dBm	-	15	-	dB	
ISL	isolation		-	37	-	dB	
NF	noise figure	P <sub>i</sub> = -40 dBm, no jammer	[1]	-	0.65	-	dB
		P <sub>i</sub> = -40 dBm, no jammer	[2]	-	0.70	-	dB
		P <sub>jam</sub> = -20 dBm; f <sub>jam</sub> = 850 MHz	[2]	-	0.9	-	dB
		P <sub>jam</sub> = -20 dBm; f <sub>jam</sub> = 1850 MHz	[2]	-	1.2	-	dB
P <sub>i(1dB)</sub>	input power at 1 dB gain compression		-	-7	-	dBm	

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

$f = 1575\text{ MHz}$ ;  $V_{CC} = 2.85\text{ V}$ ;  $V_{I(ENABLE)} \geq 0.8\text{ V}$ ;  $P_i < -40\text{ dBm}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ ; input matched to  $50\text{ }\Omega$  using a  $5.6\text{ nH}$  inductor, see [Figure 1](#); unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IP <sub>3i</sub>	input third-order intercept point		[3]	-	6	- dBm
			[4]	-	6	- dBm
t <sub>on</sub>	turn-on time	time from V <sub>I(ENABLE)</sub> ON, to 90 % of the gain	-	-	2	μs
t <sub>off</sub>	turn-off time	time from V <sub>I(ENABLE)</sub> OFF, to 10 % of the gain	-	-	1	μs

[1] PCB losses are subtracted

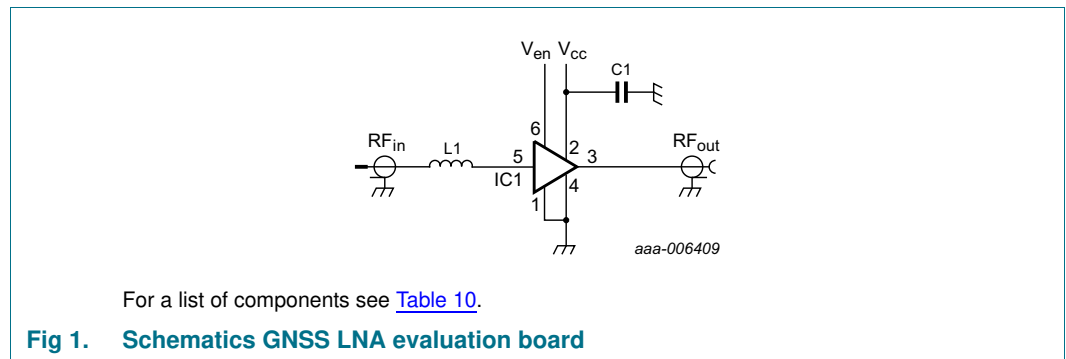
[2] Including PCB losses

[3]  $f_1 = 1713\text{ MHz}$ ;  $f_2 = 1851\text{ MHz}$ ,  $P_{i1} = -20\text{ dBm}$  per carrier

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

## 9. Application information

### 9.1 GNSS LNA



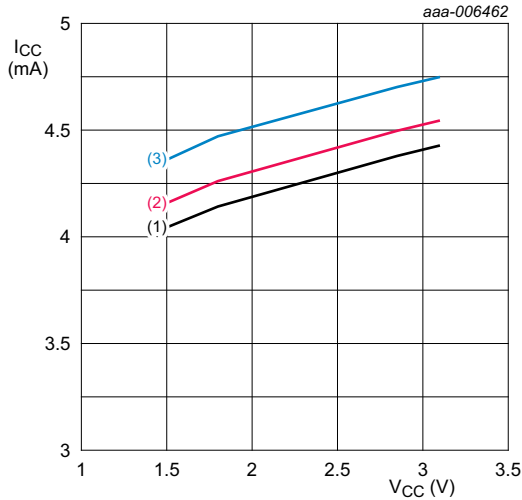
**Table 10. List of components**

For schematics see [Figure 1](#).

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

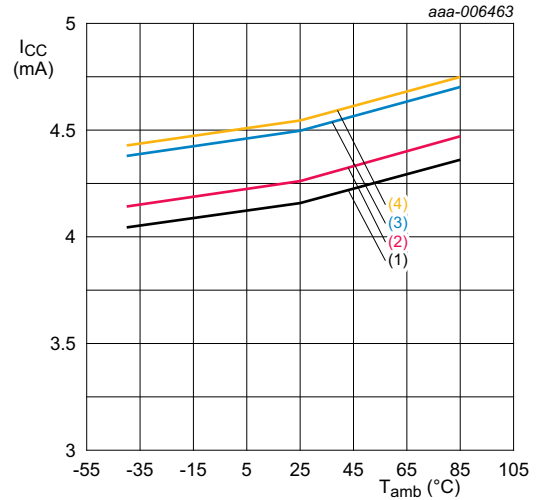
See application note AN11288 for details.

9.2 Graphs



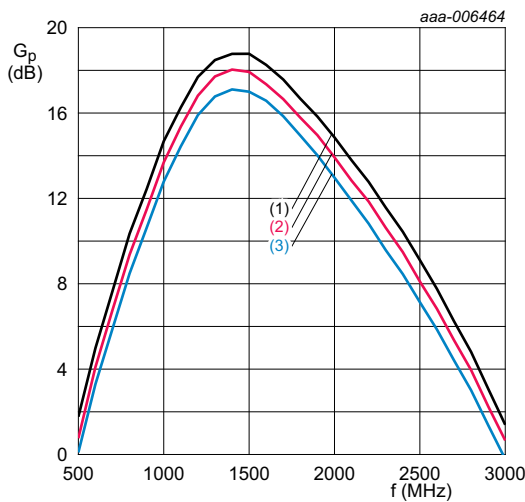
$P_i = -45$  dBm.  
 (1)  $T_{amb} = -40$  °C  
 (2)  $T_{amb} = +25$  °C  
 (3)  $T_{amb} = +85$  °C

**Fig 2. Supply current as a function of supply voltage; typical values**



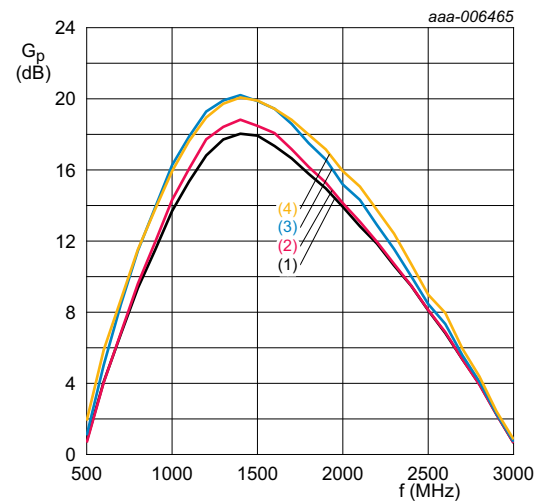
$P_i = -45$  dBm.  
 (1)  $V_{CC} = 1.5$  V  
 (2)  $V_{CC} = 1.8$  V  
 (3)  $V_{CC} = 2.85$  V  
 (4)  $V_{CC} = 3.1$  V

**Fig 3. Supply current as a function of ambient temperature; typical values**



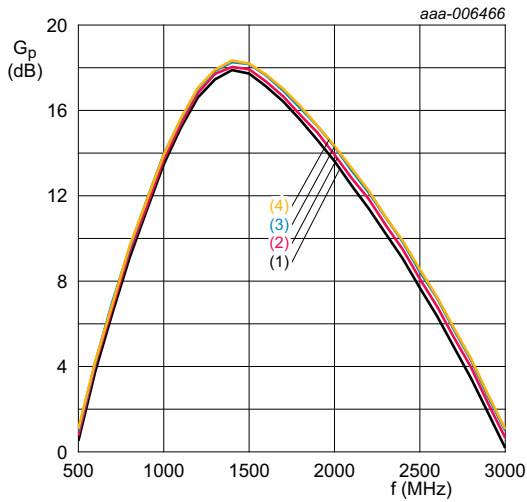
$P_i = -45$  dBm;  $V_{CC} = 1.8$  V.  
 (1)  $T_{amb} = -40$  °C  
 (2)  $T_{amb} = +25$  °C  
 (3)  $T_{amb} = +85$  °C

**Fig 4. Power gain as a function of frequency; typical values**



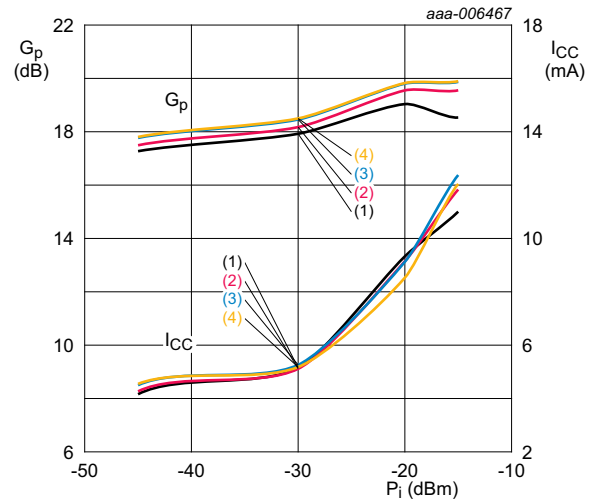
$T_{amb} = 25$  °C;  $V_{CC} = 1.8$  V.  
 (1)  $P_i = -45$  dBm  
 (2)  $P_i = -30$  dBm  
 (3)  $P_i = -20$  dBm  
 (4)  $P_i = -15$  dBm

**Fig 5. Power gain as a function of frequency; typical values**



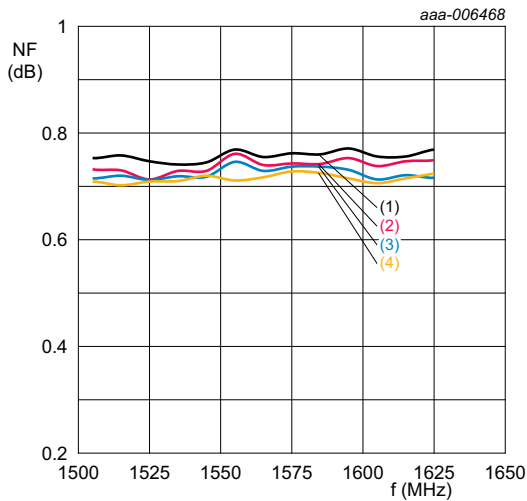
$P_i = -45 \text{ dBm}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

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



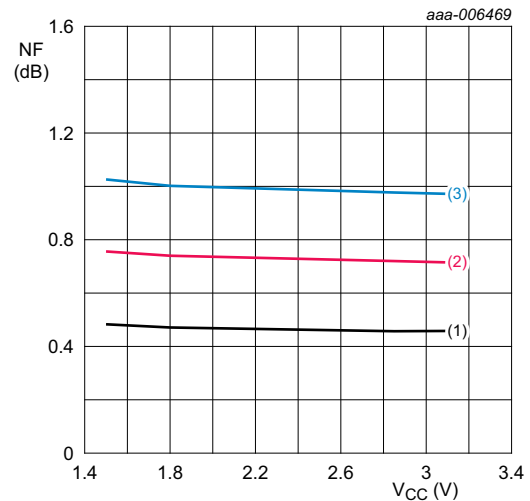
$f = 1575 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

**Fig 7. Power gain and supply current as function of input power; typical values**



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

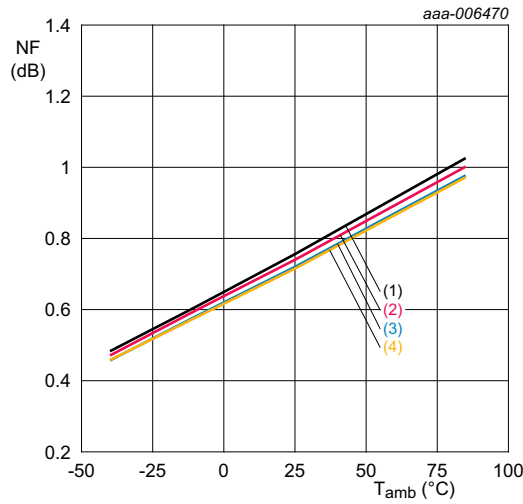
**Fig 8. Noise figure as a function of frequency; typical values**



$f = 1575 \text{ MHz};$  no jammer, including PCB losses.  
 (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 9. Noise figure as a function of supply voltage; typical values**

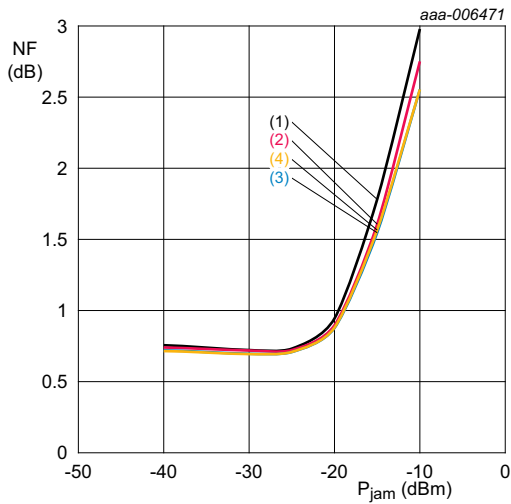




f = 1575 MHz; no jammer, including PCB losses.

- (1) V<sub>CC</sub> = 1.5 V
- (2) V<sub>CC</sub> = 1.8 V
- (3) V<sub>CC</sub> = 2.85 V
- (4) V<sub>CC</sub> = 3.1 V

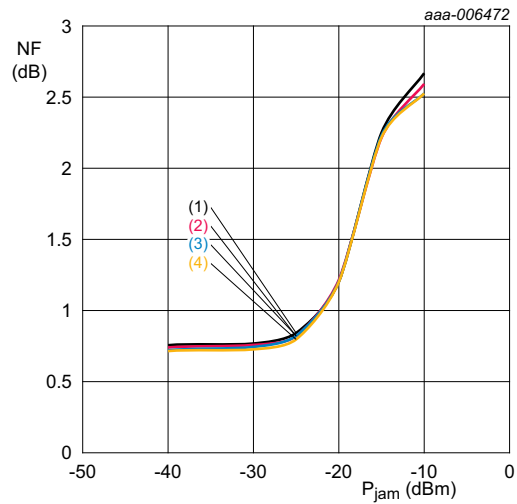
Fig 10. Noise figure as a function of ambient temperature; typical values



f<sub>jam</sub> = 850 MHz; T<sub>amb</sub> = 25 °C; f = 1575 MHz; including PCB losses.

- (1) V<sub>CC</sub> = 1.5 V
- (2) V<sub>CC</sub> = 1.8 V
- (3) V<sub>CC</sub> = 2.85 V
- (4) V<sub>CC</sub> = 3.1 V

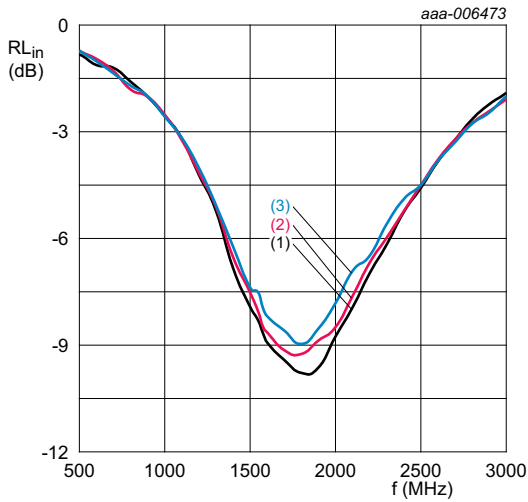
Fig 11. Noise figure as a function of jamming power; typical values



f<sub>jam</sub> = 1850 MHz; T<sub>amb</sub> = 25 °C; f = 1575 MHz; including PCB losses.

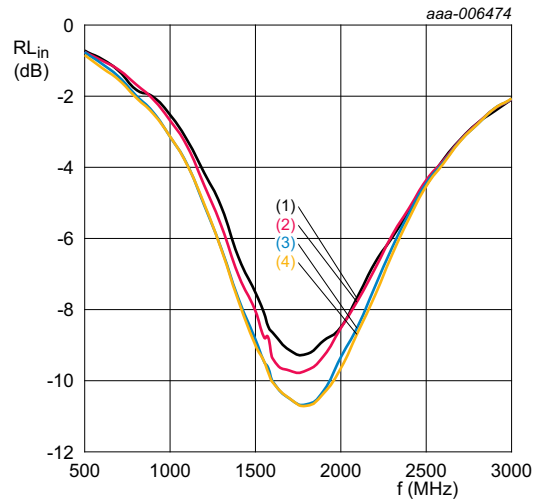
- (1) V<sub>CC</sub> = 1.5 V
- (2) V<sub>CC</sub> = 1.8 V
- (3) V<sub>CC</sub> = 2.85 V
- (4) V<sub>CC</sub> = 3.1 V

Fig 12. Noise figure as a function of jamming power; typical values



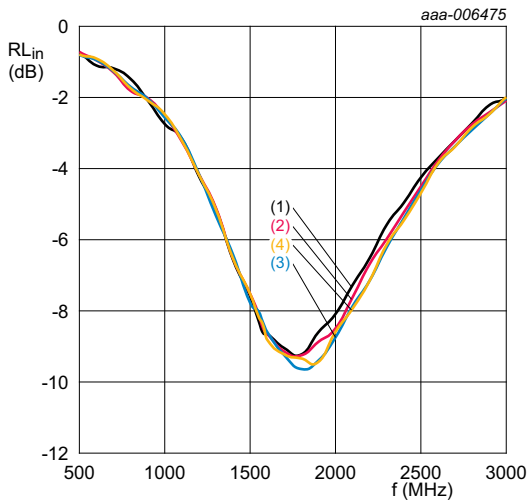
$P_i = -45 \text{ dBm}; V_{CC} = 1.8 \text{ V}.$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = +25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = +85 \text{ }^\circ\text{C}$

**Fig 13. Input return loss as a function of frequency; typical values**



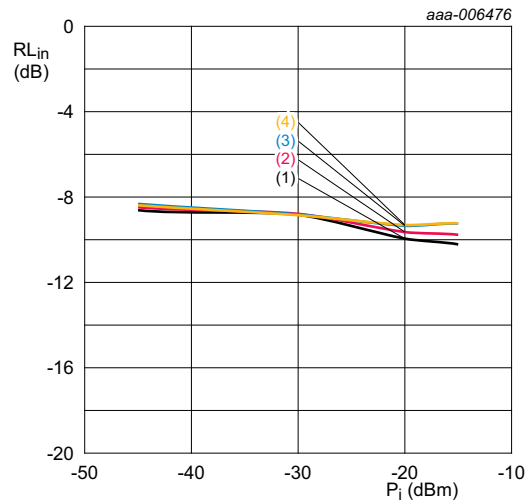
$T_{amb} = 25 \text{ }^\circ\text{C}; V_{CC} = 1.8 \text{ V}.$   
 (1)  $P_i = -45 \text{ dBm}$   
 (2)  $P_i = -30 \text{ dBm}$   
 (3)  $P_i = -20 \text{ dBm}$   
 (4)  $P_i = -15 \text{ dBm}$

**Fig 14. Input return loss as a function of frequency; typical values**



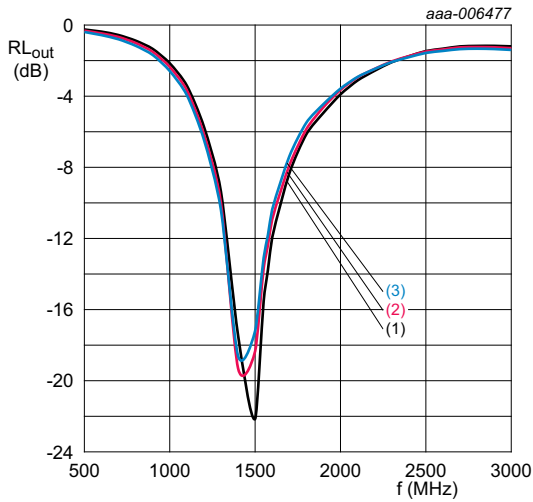
$P_i = -45 \text{ dBm}; T_{amb} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

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



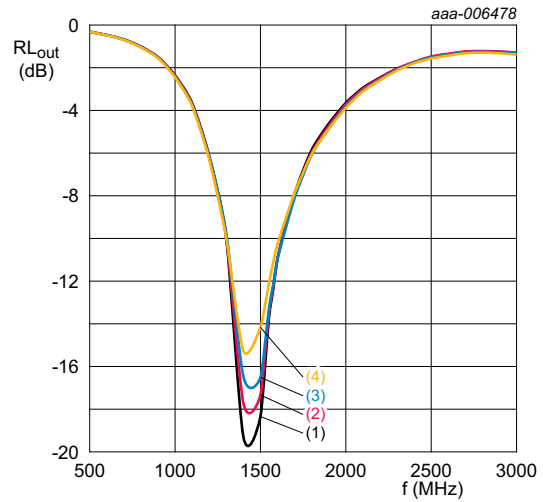
$f = 1575 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

**Fig 16. Input return loss as a function of input power; typical values**



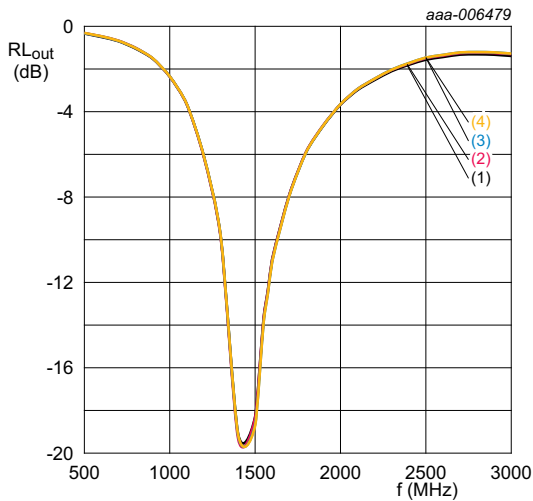
$P_i = -45 \text{ dBm}; V_{CC} = 1.8 \text{ V}.$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = +25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = +85 \text{ }^\circ\text{C}$

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



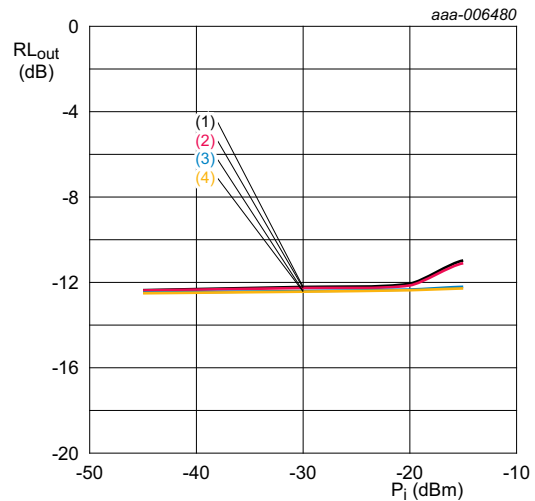
$T_{amb} = 25 \text{ }^\circ\text{C}; V_{CC} = 1.8 \text{ V}.$   
 (1)  $P_i = -45 \text{ dBm}$   
 (2)  $P_i = -30 \text{ dBm}$   
 (3)  $P_i = -20 \text{ dBm}$   
 (4)  $P_i = -15 \text{ dBm}$

**Fig 18. Output return loss as a function of frequency; typical values**



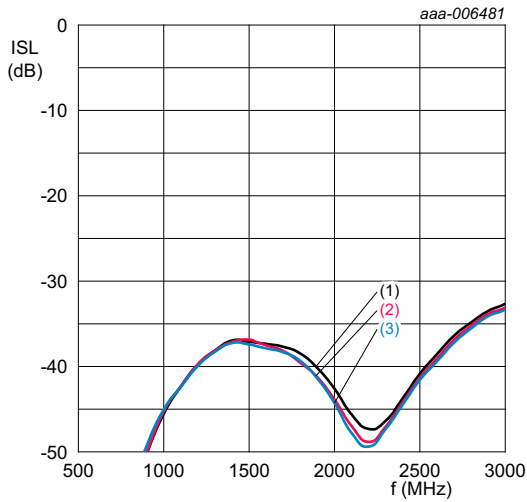
$P_i = -45 \text{ dBm}; T_{amb} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

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



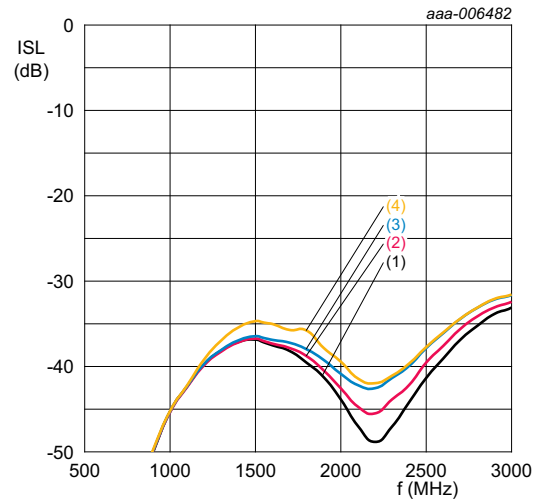
$f = 1575 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

**Fig 20. Output return loss as a function of input power; typical values**



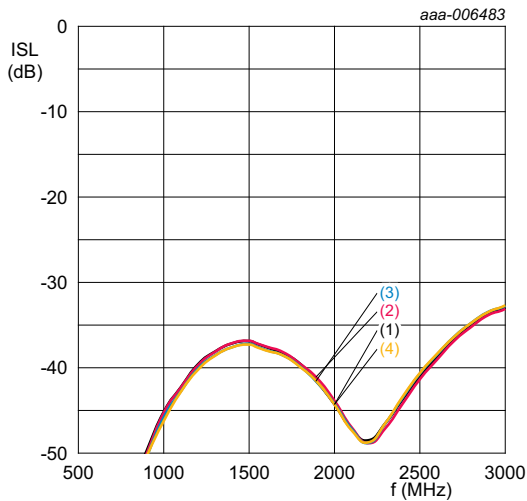
$P_i = -45 \text{ dBm}; V_{CC} = 1.8 \text{ V}.$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = +25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = +85 \text{ }^\circ\text{C}$

**Fig 21. Isolation as a function of frequency; typical values**



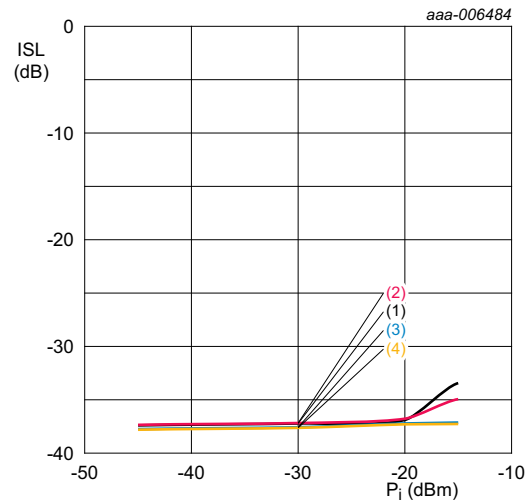
$T_{amb} = 25 \text{ }^\circ\text{C}; V_{CC} = 1.8 \text{ V}.$   
 (1)  $P_i = -45 \text{ dBm}$   
 (2)  $P_i = -30 \text{ dBm}$   
 (3)  $P_i = -20 \text{ dBm}$   
 (4)  $P_i = -15 \text{ dBm}$

**Fig 22. Isolation as a function of frequency; typical values**



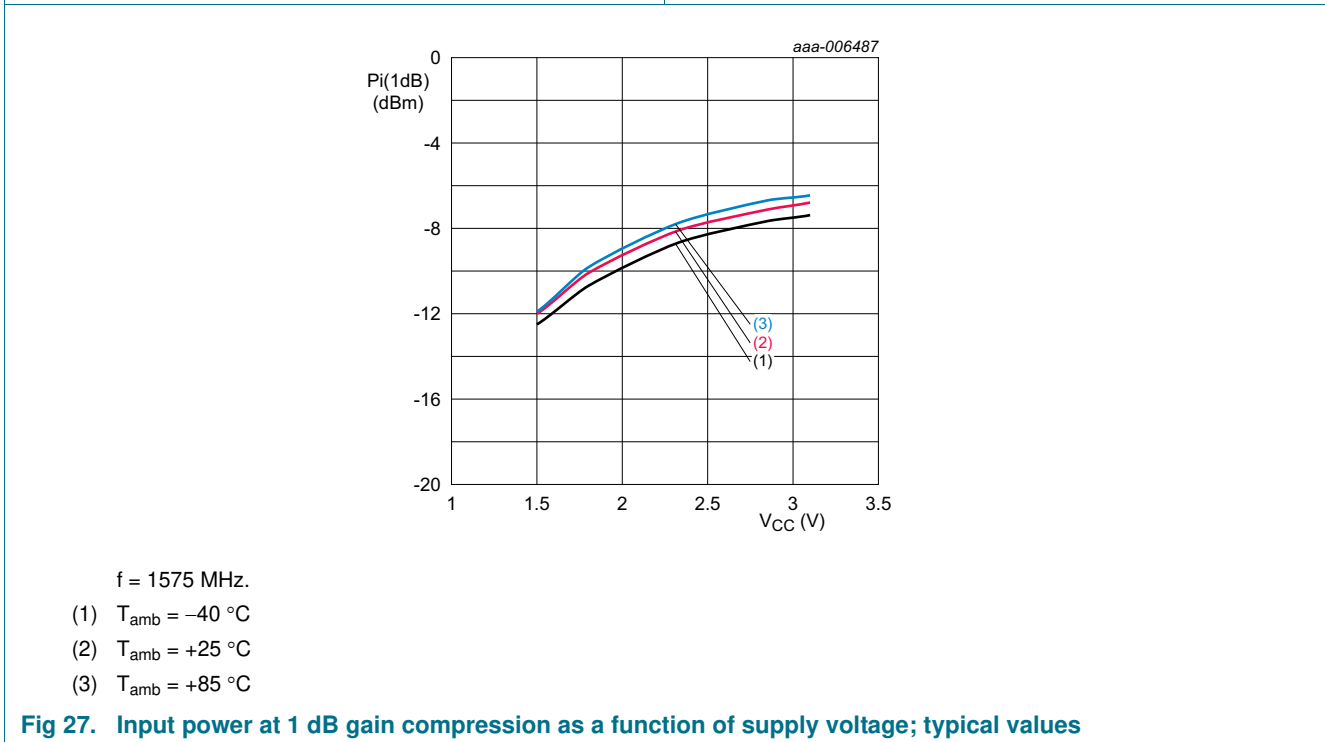
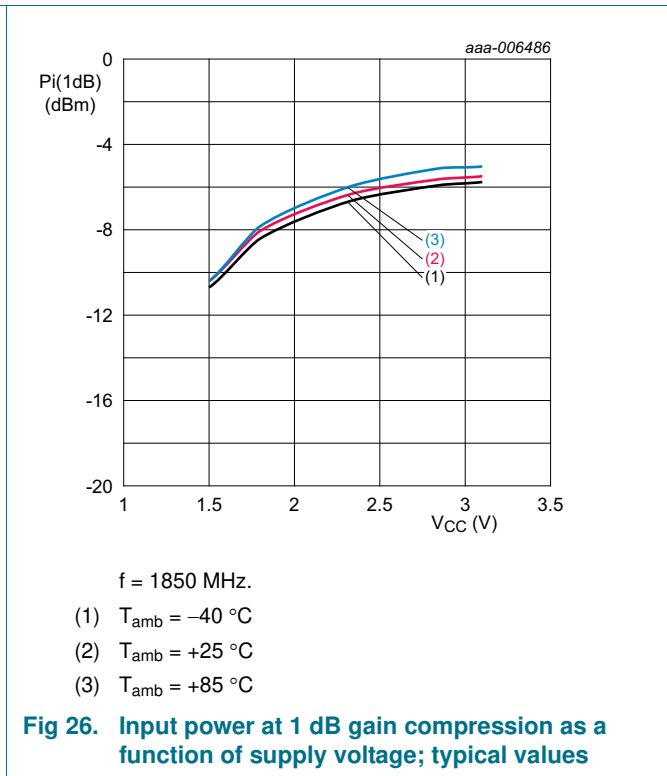
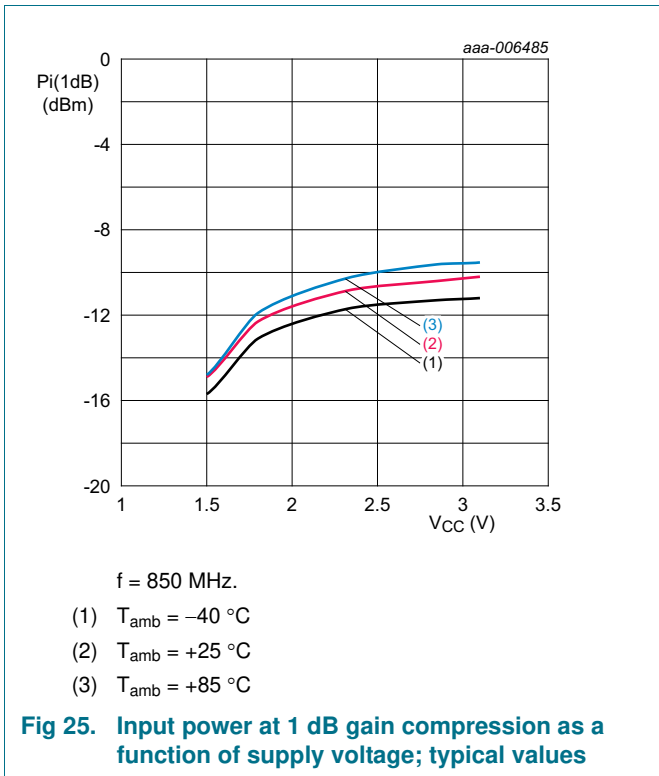
$P_i = -45 \text{ dBm}; T_{amb} = 25 \text{ }^\circ\text{C}.$   
 (1)  $V_{CC} = 1.5 \text{ V}$   
 (2)  $V_{CC} = 1.8 \text{ V}$   
 (3)  $V_{CC} = 2.85 \text{ V}$   
 (4)  $V_{CC} = 3.1 \text{ V}$

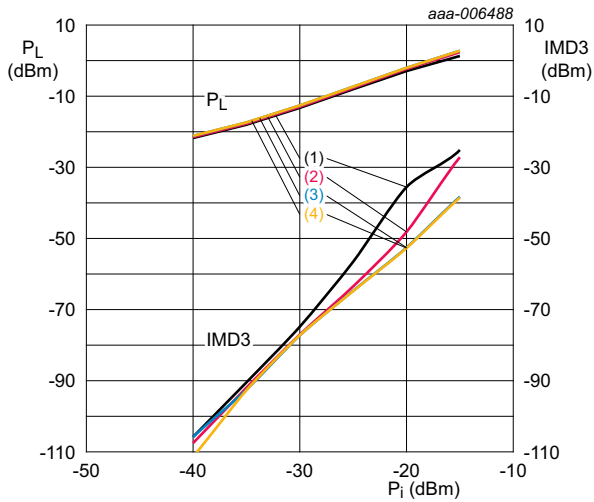
**Fig 23. Isolation as a function of frequency; typical values**



$f = 1575 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}.$   
 (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 24. Isolation as a function of input power; typical values**

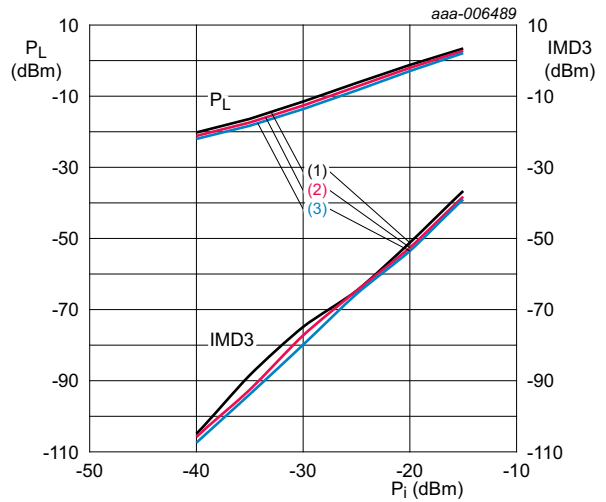




$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1575\text{ MHz}$ ;  $f_1 = 1713\text{ MHz}$ ;  $f_2 = 1851\text{ MHz}$ ;  $P_i$  per carrier.

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

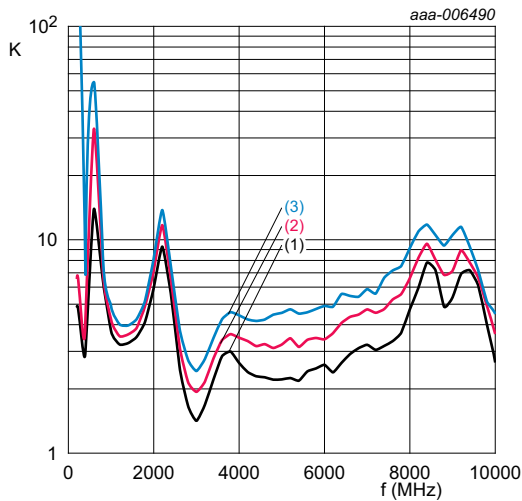
**Fig 28. Output power and third order intermodulation distortion as function of input power; typical values**



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

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

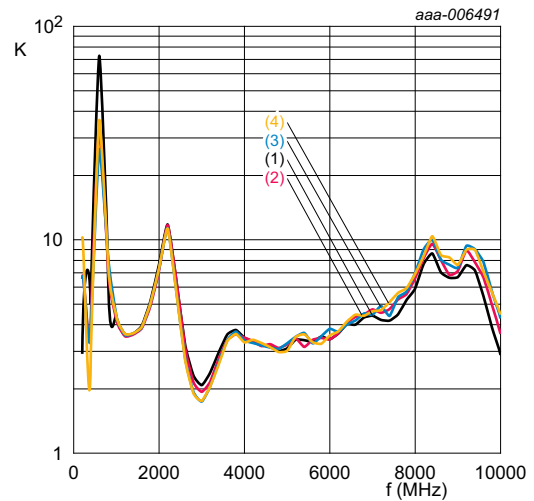
**Fig 29. Output power and third order intermodulation distortion as function of input power; typical values**



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

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

10. Package outline

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

SOT1230

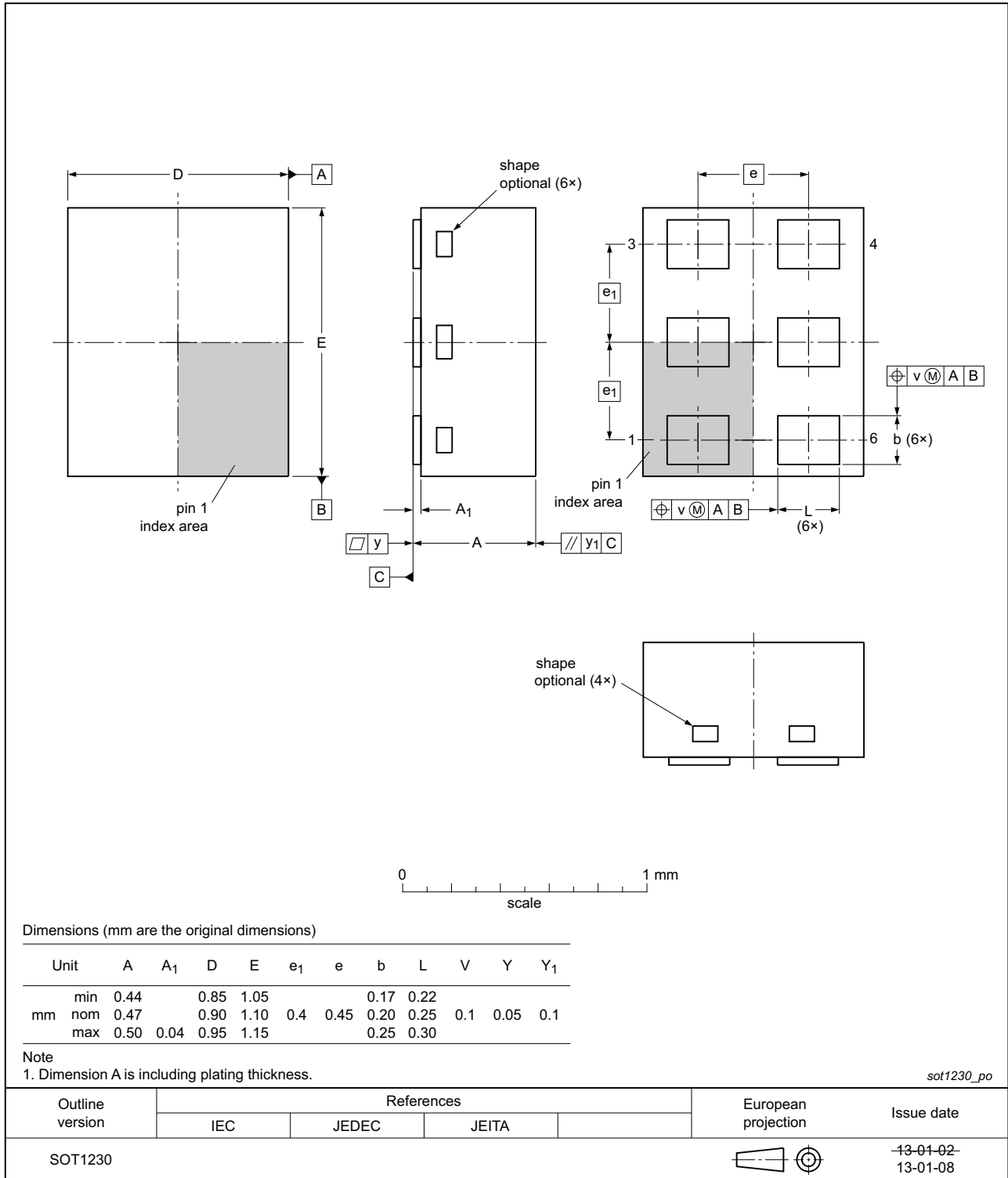


Fig 32. Package outline SOT1230 (XSON6)

## 11. 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

## 12. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU8009 v.1	20130201	Product data sheet	-	-



## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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Date of release: 1 February 2013

Document identifier: BGU8009