# BGU6101

## Wideband silicon low-noise amplifier MMIC

Rev. 2 — 3 February 2012 Product data sheet

# 1. Product profile

## 1.1 General description

The BGU6101 MMIC is an unmatched wideband MMIC featuring an integrated bias, enable function and wide supply voltage. BGU6101 is part of a family of three products (BGU6101, BGU6102 and BGU6104) and is optimized for 1 mA operation.

## 1.2 Features and benefits

- Supply voltage range from 1.5 V to 5 V
- Current range up to 10 mA at 3 V and 20 mA at 5 V supply voltage
- $NF_{min}$ of 0.8 dB
- Applicable between 40 MHz and 4 GHz
- Integrated temperature-stabilized bias for easy design
- Bias current configurable with external resistor
- Power-down mode current consumption < 6 μA
- ESD protection on all pins up to 3 kV HBM
- Small 6-pin leadless package 2.0 mm × 1.3 mm × 0.35 mm

## 1.3 Applications

- FM radio
- Mobile TV, CMMB
- ISM
- Wireless security
- RKE, TPMS
- AMR, ZigBee, Bluetooth
- WiFi, WLAN (2.4 GHz)
- Low current applications

## 1.4 Quick reference data

**Table 1. Quick reference data**

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $I_{CC(tot)}$ = 1.5 mA; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $\|s_{21}\|^2$ | insertion power gain | f = 450 MHz | - | 13.0 | - | dB |
| | | f = 900 MHz | - | 12.0 | - | dB |
| | | f = 2400 MHz; $I_{CC(tot)}$ = 3 mA | - | 13.0 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 450 MHz | - | 0.8 | - | dB |
| | | f = 900 MHz | - | 0.8 | - | dB |
| | | f = 2400 MHz; $I_{CC(tot)}$ = 3 mA | - | 1.3 | - | dB |

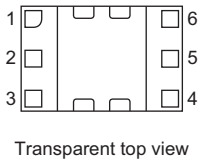
**Table 1. Quick reference data** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $I_{CC(tot)}$ = 1.5 mA; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 450 MHz | - | –11.0 | - | dBm |
| | | f = 900 MHz | - | –11.5 | - | dBm |
| | | f = 2400 MHz; $I_{CC(tot)}$ = 3 mA | - | –6.5 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 450 MHz | - | –2.5 | - | dBm |
| | | f = 900 MHz | - | –2.0 | - | dBm |
| | | f = 2400 MHz; $I_{CC(tot)}$ = 3 mA | - | 6.5 | - | dBm |

# 2. Pinning information

## 2.1 Pinning




Transparent top view

**Fig 1. Pin configuration**

## 2.2 Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| $V_{CC}$ | 1 | supply voltage |
| n.c. | 2 | not connected |
| RF_IN | 3 | RF in |
| RF_OUT | 4 | RF out |
| ENABLE | 5 | enable |
| CUR_ADJ | 6 | current adjust |
| GND | GND | ground pad; RF and DC ground |

# 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BGU6101 | HXSON6 | plastic thermal enhanced super thin small outline package; no leads; 6 terminals; body 2 x 1.3 x 0.35 mm | SOT1209 |

## 4. Marking

**Table 4. Marking**

| Type number | Marking | Description |
|---|---|---|
| BGU6101 | 1A* | * = p : made in Hong Kong |
| | | * = t : made in Malaysia |
| | | * = W : made in China |

## 5. Limiting values

**Table 5. Limiting values**

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | RF input, AC coupled | | - | 5.5 | V |
| $V_{ENABLE}$ | voltage on pin ENABLE | | [1] | –0.5 | $V_{CC}$ + 1.8 | V |
| $V_{RF\_IN}$ | voltage on pin IN | DC | [2] | –0.5 | 0.9 | V |
| $V_{RF\_OUT}$ | voltage on pin RF_OUT | DC | | –0.5 | $V_{CC}$ + 0.6 | V |
| $I_{CC(tot)}$ | total supply current | $V_{CC}$ = 5.0 V | | - | 40 | mA |
| $T_{stg}$ | storage temperature | | | –55 | +150 | °C |
| $T_j$ | junction temperature | | | - | +150 | °C |
| $V_{ESD}$ | electrostatic discharge voltage | Human Body Model (HBM); according to JEDEC standard 22-A114E | | - | 3000 | V |
| | | Charged Device Model (CDM); according to JEDEC standard 22-C101B | | - | 500 | V |

[1] Due to internal ESD diode protection, the applied voltage should not exceed the specified maximum in order to avoid excess current.

[2] The RF input is directly coupled to the base of the RF transistor.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol | Parameter | Conditions | Typ | Unit |
|---|---|---|---|---|
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | 110 | K/W |

# 7. Static characteristics

**Table 7. Static characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | RF input, AC coupled | | 1.5 | - | 5.0 | V |
| $I_{CC(tot)}$ | total supply current | $V_{CC}$ = 3.0 V | [1][2] | 0.9 | - | 10 | mA |
| | | $V_{ENABLE} \leq 0.4$ V | [1] | - | - | 0.01 | mA |
| $T_{amb}$ | ambient temperature | | | –40 | +25 | +85 | °C |

[1] $I_{CC(tot)} = I_{CC} + I_{RF\_OUT} + I_{R\_BIAS}$.

[2] Configurable with external resistor.

# 8. Dynamic characteristics

**Table 8. Dynamic characteristics**

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **100 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 100 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 10.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 13.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 18.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 22.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 26.5 | - | dB |
| MSG | maximum stable gain | f = 100 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 29.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 31.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 33.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 35.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 38.0 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 100 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.0 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 100 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −12.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −11.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.0 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 3.5 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 100 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −5.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 4.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 9.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 14.0 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq$ 1.2 V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **150 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 150 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 10.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 13.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 18.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 22.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 26.5 | - | dB |
| MSG | maximum stable gain | f = 150 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 27.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 29.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 32.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 34.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 36.0 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 150 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.0 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 150 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −12.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −11.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.0 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 3.0 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 150 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −5.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 4.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 9.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 14.0 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **450 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 450 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 10.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 13.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 18.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 22.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 25.5 | - | dB |
| MSG | maximum stable gain | f = 450 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 23.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 24.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 27.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 29.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 31.5 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 450 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.0 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 450 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −12.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −11.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.0 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 3.0 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 450 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −5.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 4.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 9.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 14.0 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq$ 1.2 V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **900 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 9.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 12.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 17.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 20.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 23.5 | - | dB |
| MSG | maximum stable gain | f = 900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 20.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 21.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 24.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 26.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 28.5 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 0.9 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 0.8 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 0.9 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −13.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −11.5 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 3.0 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −5.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −2.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 5.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 10.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 14.5 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **1500 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 1500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 8.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 11.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 15.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 18.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 21.0 | - | dB |
| MSG | maximum stable gain | f = 1500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 18.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 19.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 22.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 24.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 26.5 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 1500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 1.1 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 1.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 0.9 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 0.9 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.0 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 1500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −13.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −12.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 3.5 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 1500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −4.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −1.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 11.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 15.5 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **1900 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 1900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 7.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 10.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 14.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 17.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 19.5 | - | dB |
| MSG | maximum stable gain | f = 1900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 17.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 18.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 21.5 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 23.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 25.5 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 1900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 1.3 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 1.2 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 1.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 1.0 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.1 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 1900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −13.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −12.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 4.0 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 1900 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −4.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −1.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 11.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 16.0 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **2400 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 2400 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 6.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 8.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 13.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 15.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 17.5 | - | dB |
| MSG | maximum stable gain | f = 2400 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 16.5 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 18.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 21.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 22.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 24.5 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 2400 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 1.7 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 1.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 1.3 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 1.2 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.3 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 2400 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −13.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −12.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.5 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 4.0 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 2400 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −4.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −0.5 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 6.5 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 11.5 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 16.5 | - | dBm |

**Table 8. Dynamic characteristics** *...continued*

*$T_{amb}$ = 25 °C; $V_{CC}$ = 3.0 V; $V_{ENABLE} \geq 1.2$ V unless otherwise specified. All measurements done on characterization board without matching, de-embedded up to the pins.*

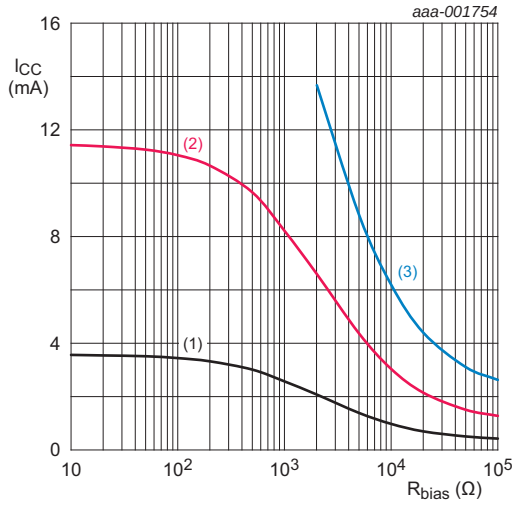
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **3500 MHz frequency** | | | | | | |
| $\|s_{21}\|^2$ | insertion power gain | f = 3500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 4.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 6.0 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 10.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 12.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 14.5 | - | dB |
| MSG | maximum stable gain | f = 3500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 15.0 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 16.5 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 18.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 18.5 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 19.5 | - | dB |
| $NF_{min}$ | minimum noise figure | f = 3500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | 2.4 | - | dB |
| | | $I_{CC(tot)}$ = 1.5 mA | - | 2.3 | - | dB |
| | | $I_{CC(tot)}$ = 3 mA | - | 2.0 | - | dB |
| | | $I_{CC(tot)}$ = 5 mA | - | 1.9 | - | dB |
| | | $I_{CC(tot)}$ = 10 mA | - | 1.8 | - | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 3500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −13.5 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −12.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | −7.0 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | −2.0 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 3.5 | - | dBm |
| $IP3_O$ | output third-order intercept point | f = 3500 MHz | | | | |
| | | $I_{CC(tot)}$ = 1.1 mA | - | −5.0 | - | dBm |
| | | $I_{CC(tot)}$ = 1.5 mA | - | −1.0 | - | dBm |
| | | $I_{CC(tot)}$ = 3 mA | - | 6.0 | - | dBm |
| | | $I_{CC(tot)}$ = 5 mA | - | 10.5 | - | dBm |
| | | $I_{CC(tot)}$ = 10 mA | - | 16.5 | - | dBm |

## 9. Enable control

**Table 9. ENABLE (pin 5)**

*−40 °C ≤ $T_{amb}$ ≤ +85 °C.*

| $V_{ENABLE}$ (V) | State |
|---|---|
| ≤ 0.4 | OFF |
| ≥ 1.2 | ON |



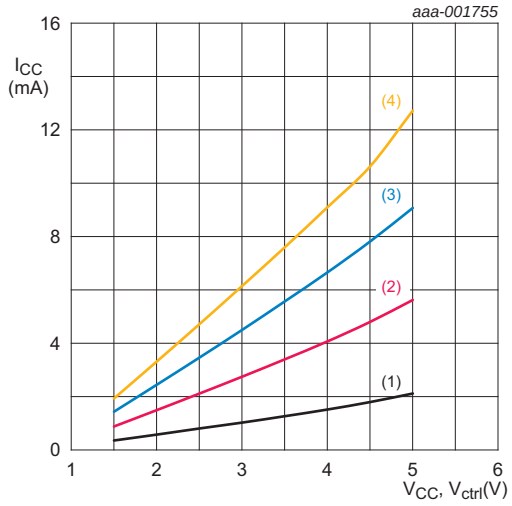

$T_{amb}$ = 25 °C.

(1) $V_{CC}$ = 1.5 V

(2) $V_{CC}$ = 3 V

(3) $V_{CC}$ = 5 V

**Fig 2. Supply current as a function of bias resistor; typical values**




$T_{amb}$ = 25 °C.

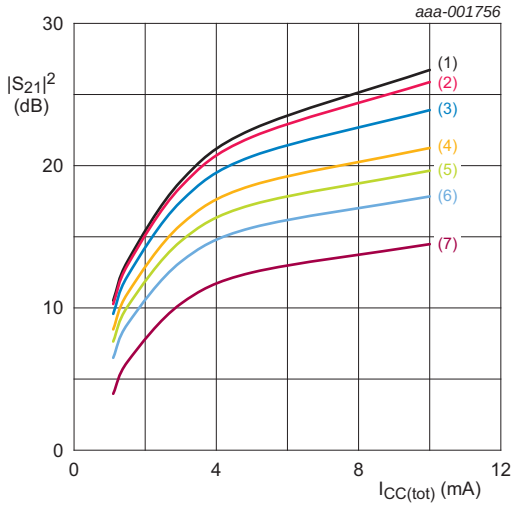
(1) $R_{bias}$ = OPEN

(2) $R_{bias}$ = 12 kΩ

(3) $R_{bias}$ = 4.7 kΩ

(4) $R_{bias}$ = 2.4 kΩ

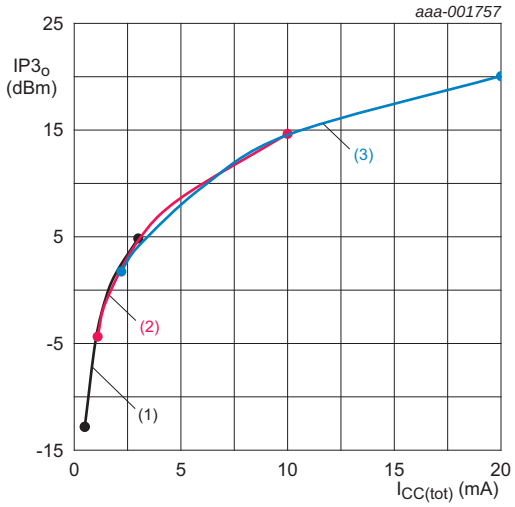
**Fig 3. Supply current as a function of supply voltage and control voltage; typical values**




$T_{amb}$ = 25 °C; $V_{CC}$ = 3 V; $P_i$ = −30 dBm.

(1) f = 150 MHz
(2) f = 450 MHz
(3) f = 900 MHz
(4) f = 1500 MHz
(5) f = 1900 MHz
(6) f = 2400 MHz
(7) f = 3500 MHz

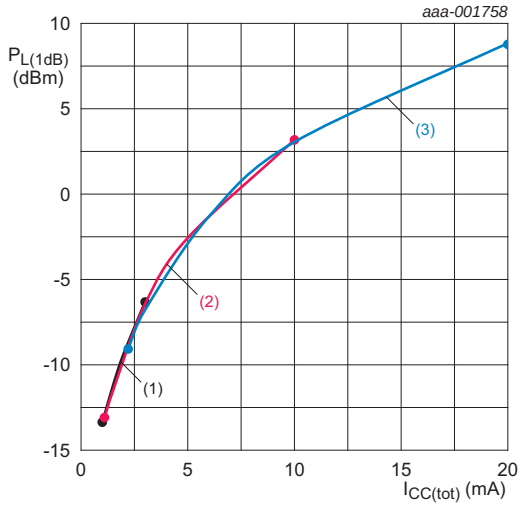
**Fig 4. Insertion power gain ($|s_{21}|^2$) as a function of total supply current; typical values**




$T_{amb}$ = 25 °C; $f_1$ = 900 MHz; $f_2$ = 900.2 MHz; $P_i$ = −30 dBm.

(1) $V_{CC}$ = 1.5 V
(2) $V_{CC}$ = 3 V
(3) $V_{CC}$ = 5 V

**Fig 5. Output third-order intercept point as a function of total supply current; typical values**



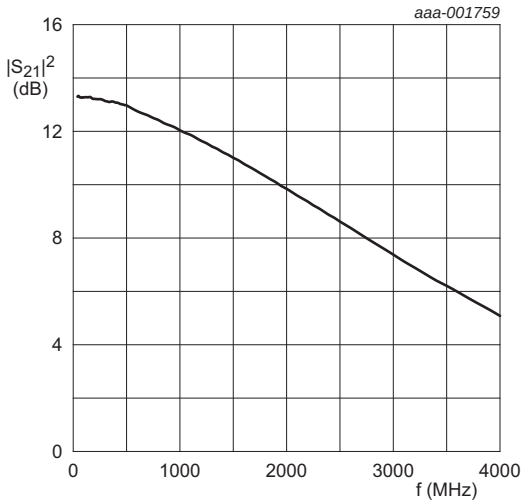

$T_{amb}$ = 25 °C; f = 900 MHz.

(1) $V_{CC}$ = 1.5 V

(2) $V_{CC}$ = 3 V

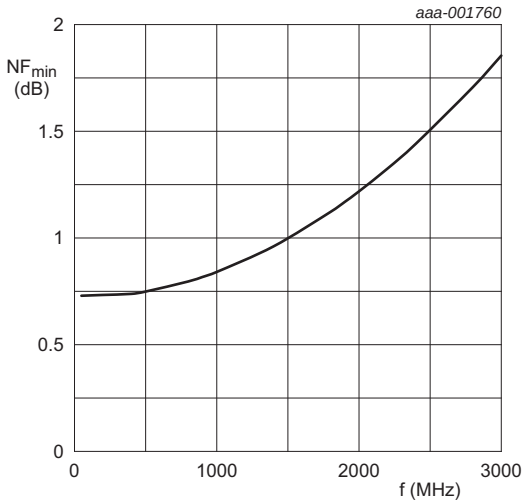
(3) $V_{CC}$ = 5 V

**Fig 6. Output power at 1 dB gain compression as a function of total supply current; typical values**




$T_{amb}$ = 25 °C; $I_{CC(tot)}$ = 1.5 mA; $V_{CC}$ = 3 V; $P_i$ = –30 dBm.

**Fig 7. Insertion power gain ($|s_{21}|^2$) as a function of frequency; typical values**

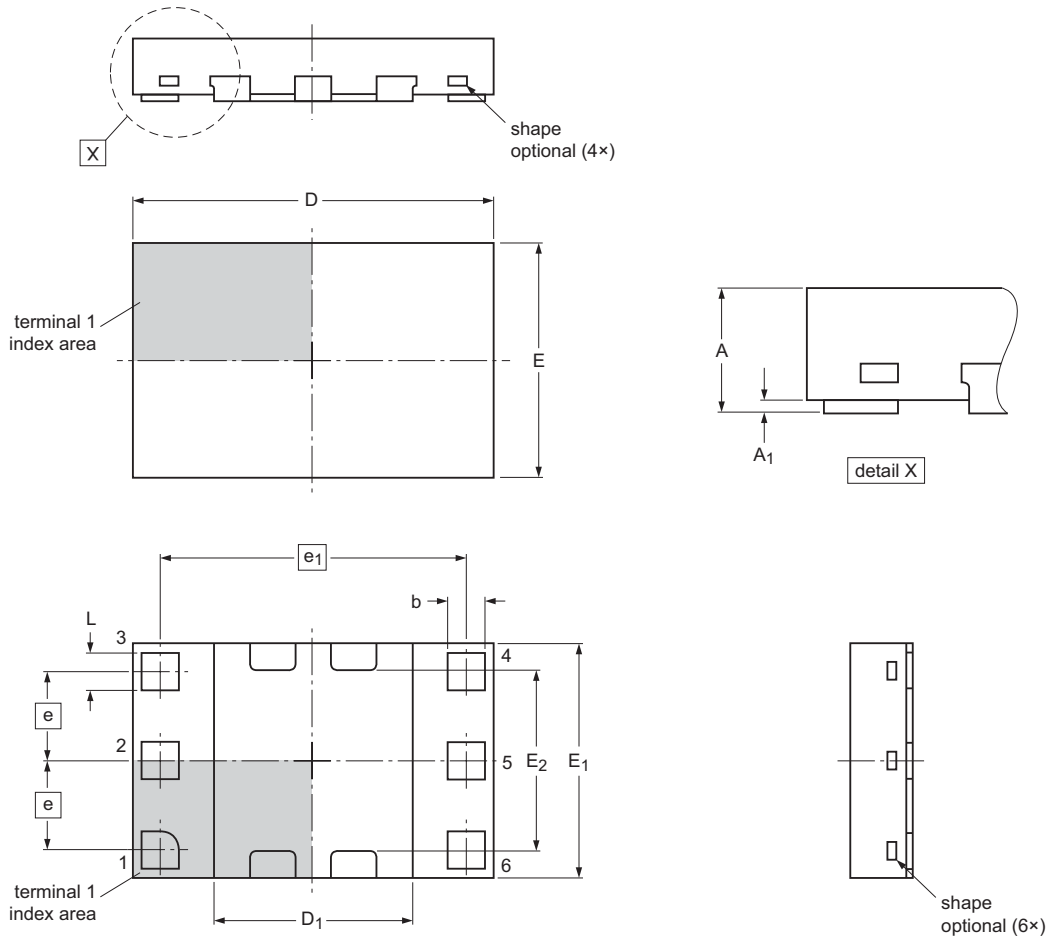



$T_{amb}$ = 25 °C; $I_{CC(tot)}$ = 1.5 mA; $V_{CC}$ = 3 V.

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

## 10. Package outline

**HXSON6: plastic thermal enhanced super thin small outline package; no leads; 6 terminals; body 2 x 1.3 x 0.35 mm** **SOT1209**




Dimensions

| Unit | | A | $A_1$ | b | D | $D_1$ | E | $E_1$ | $E_2$ | e | $e_1$ | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | | | 0.15 | 1.9 | 1.0 | 1.2 | 1.2 | | | | 0.15 |
| | nom | | | | | | | | 1.0 | 0.5 | 1.7 | |
| | min | 0.35 | 0.04 | 0.25 | 2.1 | 1.2 | 1.4 | 1.4 | | | | 0.25 |

Note
1. Dimension A is including plating thickness.

*sot1209_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1209 | | | | | | ~~11-06-10~~ 11-09-15 |

**Fig 9. Package outline SOT1209**

## 11. Abbreviations

Table 10. Abbreviations

| Acronym | Description |
|---|---|
| AC | Alternating Current |
| AMR | Automated Meter Reading |
| CMMB | China Mobile Multimedia Broadcasting |
| DC | Direct Current |
| ESD | ElectroStatic Discharge |
| FM | Frequency Modulation |
| ISM | Industrial Scientific Medical |
| MMIC | Monolithic Microwave Integrated Circuit |
| RF | Radio Frequency |
| RKE | Remote Keyless Entry |
| TPMS | Tire-Pressure Monitoring System |
| WLAN | Wireless Local Area Network |

## 12. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BGU6101 v.2 | 20120203 | Product data sheet | - | BGU6101 v.1 |
| Modifications: | • Section 1 on page 1, Table 2 on page 2, Table 3 on page 2, Table 5 on page 3, Table 8 on page 5: Updated<br>• Section 9 on page 13: Added figures | | | |
| BGU6101 v.1 | 20110921 | Preliminary 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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## 15. Contents





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Document identifier: BGU6101