



# BGS8L2

SiGe:C Low-noise amplifier MMIC with bypass switch for LTE  
Rev. 6 — 29 June 2018

Product data sheet

## 1 General description

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The BGS8L2, also known as the LTE3001L, is a Low-Noise Amplifier (LNA) with bypass switch for LTE receiver applications, available in a small plastic 6-pin extremely thin leadless package. The BGS8L2 requires one external matching inductor.

The BGS8L2 delivers system-optimized gain for both primary and diversity applications where sensitivity improvement is required. The high linearity of these low noise devices ensures the required receive sensitivity independent of cellular transmit power level in FDD (Frequency Division Duplex) systems. When receive signal strength is sufficient, the BGS8L2 can be switched off to operate in bypass mode at a 1  $\mu$ A current, to lower power consumption.

The BGS8L2 can also be used in Digital TV receivers in the frequency range 460 MHz - 740 MHz.

The BGS8L2 is optimized for 460 MHz to 960 MHz.

## 2 Features and benefits

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- Operating frequency from 460 MHz to 960 MHz
- Noise figure = 0.85 dB
- Gain 13 dB
- High input 1 dB compression point of -1 dBm
- Bypass switch insertion loss of 1.9 dB
- IP<sub>3i</sub> of 1.5 dBm
- Supply voltage 1.5 V to 3.1 V
- Self-shielding package concept
- Integrated supply decoupling capacitor
- Optimized performance at a supply current of 5.2 mA @ 2.8 V
- Power-down mode current consumption < 1  $\mu$ A
- Integrated temperature stabilized bias for easy design
- Requires only one input matching inductor
- Input and output DC decoupled
- ESD protection on all pins (HBM > 2 kV)
- Integrated matching for the output
- Available in 6-pins leadless package 1.1 mm × 0.7 mm × 0.37 mm; 0.4 mm pitch: SOT1232
- 180 GHz transit frequency - SiGe:C technology
- Moisture sensitivity level 1



### 3 Applications

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- LNA for LTE reception in smart phones
- Feature phones
- Tablet PCs
- RF front-end modules
- Digital TV receivers

## 4 Quick reference data

**Table 1. Quick reference data**

$f = 882 \text{ MHz}$ ;  $V_{CC} = 2.8 \text{ V}$ ;  $V_{I(CTRL)} \geq 0.8 \text{ V}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ ; input matched to  $50 \text{ } \Omega$  using a  $8.2 \text{ nH}$  inductor; unless otherwise specified.

| Symbol       | Parameter                            | Conditions         | Min | Typ  | Max | Unit          |
|--------------|--------------------------------------|--------------------|-----|------|-----|---------------|
| $V_{CC}$     | supply voltage                       |                    | 1.5 | -    | 3.1 | V             |
| $I_{CC}$     | supply current                       | in gain mode       | -   | 5.2  | -   | mA            |
|              |                                      | in bypass mode     | -   | -    | 1   | $\mu\text{A}$ |
| $G_p$        | power gain                           | in gain mode [1]   | -   | 13.0 | -   | dB            |
|              |                                      | in bypass mode [1] | -   | -1.9 | -   | dB            |
| NF           | noise figure                         | [1][2]             | -   | 0.85 | -   | dB            |
| $P_{I(1dB)}$ | input power at 1 dB gain compression | [1]                | -   | -1.0 | -   | dBm           |
| $IP3_i$      | input third-order intercept point    | [1]                | -   | 1.5  | -   | dBm           |

[1] E-UTRA operating band 5 (869 MHz to 894 MHz).

[2] PCB losses are subtracted.

## 5 Ordering information

**Table 2. Ordering information**

| Type number | Package |   |         |
|-------------|---------|---|---------|
|             | Name    | Description   | Version |
| BGS8L2      | XSON6   | plastic extremely thin small outline package; no leads; 6 terminals; body $1.1 \times 0.7 \times 0.37 \text{ mm}$ | SOT1232 |
| OM17005     | EVB     | BGS8L2 evaluation board   | -       |

## 6 Marking

**Table 3. Marking codes**

| Type number | Marking code |
|-------------|--------------|
| BGS8L2      | M            |

## 7 Block diagram

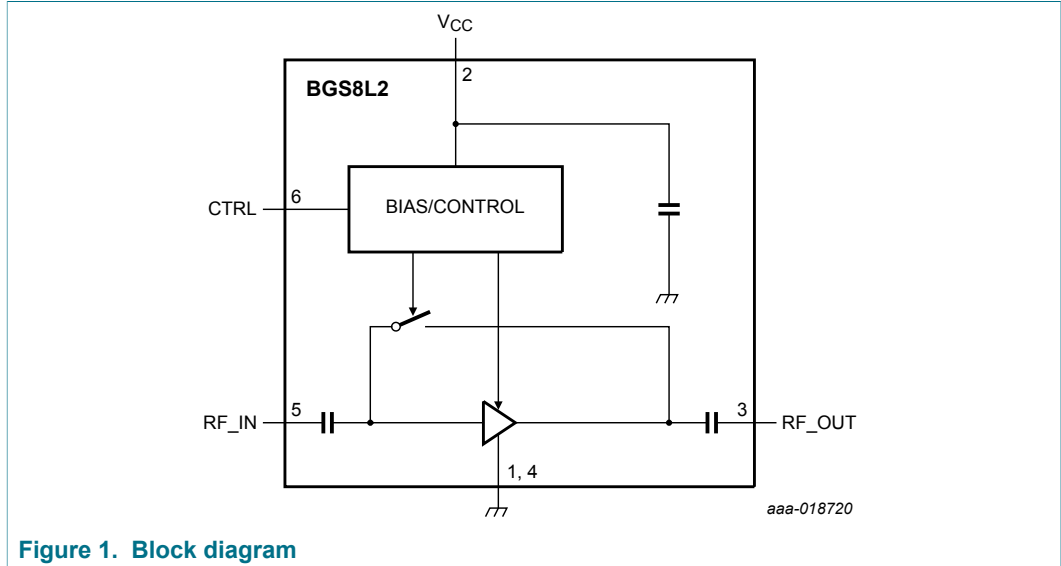


Figure 1. Block diagram

## 8 Pinning information

### 8.1 Pinning

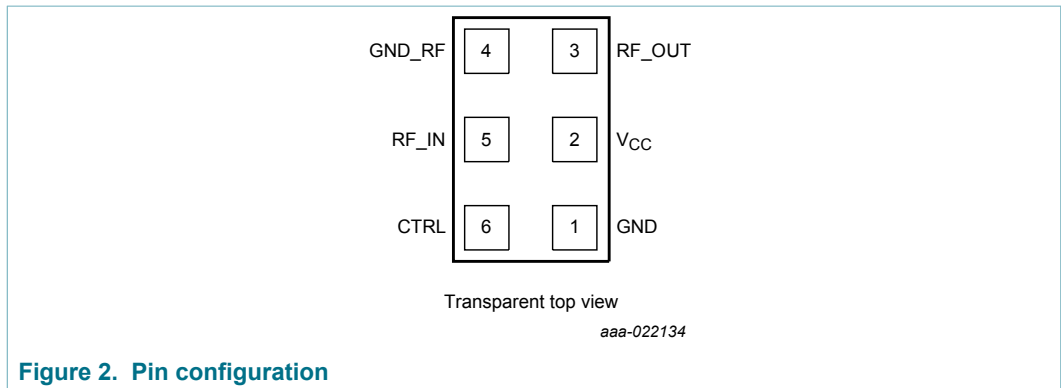


Figure 2. Pin configuration

### 8.2 Pin description

Table 4. Pinning

| Symbol          | Pin | Description                                       |
|-----------------|-----|---|
| GND             | 1   | ground  |
| V <sub>CC</sub> | 2   | supply voltage                                    |
| RF_OUT          | 3   | RF out  |
| GND_RF          | 4   | ground RF   |
| RF_IN           | 5   | RF in   |
| CTRL            | 6   | gain control, switch between gain and bypass mode |

## 9 Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). See section 18.3 "Disclaimers", paragraph "Limiting values".

| Symbol           | Parameter                       | Conditions  | Min  | Max  | Unit |
|------------------|---------------------------------|---|------|------|------|
| $V_{CC}$         | supply voltage                  | RF input AC coupled [1]   | -0.5 | +5.0 | V    |
| $V_{I(CTRL)}$    | input voltage on pin CTRL       | $V_{I(CTRL)} < V_{CC} + 0.6$ 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]                        | -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                     | [1]   | -    | 26   | 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 ANSI/ESDA/JEDEC standard JS-001 | -    | ±2   | kV   |
|                  |                                 | Charged Device Model (CDM) According to JEDEC standard JESD22-C101C | -    | ±1   | kV   |

[1] Stresses with pulses of 1 s in duration.  $V_{CC}$  connected to a power supply of 2.8 V with 500 mA current limit.

[2] Warning: Due to internal ESD diode protection, to avoid excess current, the applied DC voltage must not exceed  $V_{CC} + 0.6$  V or 5.0 V.

[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   |
| $V_{I(CTRL)}$ | input voltage on pin CTRL | OFF state  | -   | -   | 0.3      | V    |
|               |                           | ON state   | 0.8 | -   | $V_{CC}$ | 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  $V_{CC} = 1.8\text{ V}$**

$460\text{ MHz} \leq f \leq 960\text{ MHz}$ ,  $V_{CC} = 1.8\text{ V}$ ,  $V_{I(CTRL)} \geq 0.8\text{ V}$  and  $T_{amb} = 25\text{ }^\circ\text{C}$ . Input matched to  $50\ \Omega$  using application diagram figure 3 and component values as in table 10. Unless otherwise specified.

| Symbol           | Parameter          | Conditions                                      | Min  | Typ  | Max  | Unit |
|------------------|--------------------|---|------|------|------|------|
| <b>Gain mode</b> |                    |   |      |      |      |      |
| $I_{CC}$         | supply current     |   | 3.0  | 5.0  | 7.0  | mA   |
| $G_p$            | power gain         | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>          | 11.5 | 13.5 | 15.5 | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>          | 12.5 | 14.5 | 16.5 | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[1]</sup>          | 12.0 | 14.0 | 16.0 | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup>     | 11.5 | 13.5 | 15.5 | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | 11.0 | 13.0 | 15.0 | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup>     | 10.5 | 12.5 | 14.5 | dB   |
| $RL_{in}$        | input return loss  | f = 470 MHz, L1 = 18 nH <sup>[5]</sup>          | -    | 4.5  | -    | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH                         | -    | 12   | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>          | -    | 10.5 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>         | -    | 7.5  | -    | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | -    | 12.0 | -    | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>         | -    | 13.0 | -    | dB   |
| $RL_{out}$       | output return loss | f = 470 MHz, L1 = 18 nH                         | -    | 10   | -    | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH                         | -    | 20.5 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>          | -    | 21.0 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>         | -    | 21.0 | -    | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | -    | 11.0 | -    | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>         | -    | 10.0 | -    | dB   |
| ISL              | isolation          | f = 470 MHz, L1 = 18 nH                         | -    | 28.0 | -    | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH                         | -    | 24.0 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>          | -    | 23.0 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>         | -    | 23.0 | -    | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | -    | 22.0 | -    | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>         | -    | 21.5 | -    | dB   |
| NF               | noise figure       | f = 470 MHz, L1 = 18 nH <sup>[1] [6]</sup>      | -    | 0.85 | 1.30 | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH <sup>[1] [6]</sup>      | -    | 0.90 | 1.35 | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[1] [2] [6]</sup>  | -    | 0.95 | 1.40 | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2] [6]</sup> | -    | 0.85 | 1.3  | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[1] [3] [6]</sup> | -    | 0.85 | 1.3  | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4] [6]</sup> | -    | 0.90 | 1.35 | dB   |

| Symbol              | Parameter                            | Conditions   | Min   | Typ  | Max | Unit |
|---------------------|--------------------------------------|--|-------|------|-----|------|
| P <sub>I(1dB)</sub> | input power at 1 dB gain compression | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>                 | -13.0 | -9.0 | -   | dBm  |
|                     |                                      | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>                 | -12.5 | -8.5 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>             | -11.0 | -7.0 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup>            | -10.5 | -7.5 | -   | dBm  |
|                     |                                      | f = 882 MHz, L1 = 8.2 nH <sup>[1] [3]</sup>            | -10   | -6.0 | -   | dBm  |
|                     |                                      | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup>            | -9.5  | -5.5 | -   | dBm  |
| IP <sub>3i</sub>    | input third-order intercept point    | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>                 | -10.5 | -5.5 | -   | dBm  |
|                     |                                      | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>                 | -6    | -1.0 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>             | -5.5  | -0.5 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup>            | -4.0  | +1.0 | -   | dBm  |
|                     |                                      | f = 882 MHz, L1 = 8.2 nH <sup>[1] [3]</sup>            | -4.0  | +1.0 | -   | dBm  |
|                     |                                      | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup>            | -4.0  | +1.0 | -   | dBm  |
| K                   | Rollett stability factor             |  | 1     | -    | -   |      |
| t <sub>on</sub>     | turn-on time                         | time from V <sub>I(CTRL)</sub> ON to 90 % of the gain  | -     | -    | 2.7 | μs   |
| t <sub>off</sub>    | turn-off time                        | time from V <sub>I(CTRL)</sub> OFF to 10 % of the gain | -     | -    | 0.6 | μs   |



| Symbol             | Parameter          | Conditions                                  | Min  | Typ  | Max  | Unit          |  |
|--------------------|--------------------|---|------|------|------|---------------|--|
| <b>Bypass mode</b> |                    |   |      |      |      |               |  |
| $I_{CC}$           | supply current     | $V_{I(CTRL)} < 0.3 \text{ V}$               | -    | -    | 1    | $\mu\text{A}$ |  |
| $G_p$              | power gain         | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>      | -3.0 | -1.5 | 0.0  | dB            |  |
|                    |                    | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>      | -4.0 | -2.5 | -1.0 | dB            |  |
|                    |                    | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>  | -4.5 | -3.0 | -1.5 | dB            |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup> | -3.1 | -1.6 | -0.1 | dB            |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>     | -3.5 | -2.0 | -0.5 | dB            |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup> | -3.5 | -2.0 | -0.5 | dB            |  |
| $RL_{in}$          | input return loss  | f = 470 MHz, L1 = 18 nH                     | -    | 13.0 | -    | dB            |  |
|                    |                    | f = 650 MHz, L1 = 18 nH                     | -    | 7.5  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>      | -    | 6.0  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>     | -    | 14.5 | -    | dB            |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>     | -    | 11.5 | -    | dB            |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>     | -    | 10.5 | -    | dB            |  |
| $RL_{out}$         | output return loss | f = 470 MHz, L1 = 18 nH                     | -    | 12.0 | -    | dB            |  |
|                    |                    | f = 650 MHz, L1 = 18 nH                     | -    | 8.0  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>      | -    | 6.5  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>     | -    | 12.5 | -    | dB            |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>     | -    | 11.0 | -    | dB            |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>     | -    | 10.5 | -    | dB            |  |
| $\Delta\phi$       | phase variation    | between gain mode and bypass mode           |      |      |      |               |  |
|                    |                    | f = 470 MHz, L1 = 18 nH                     | -    | -    | -    | deg           |  |
|                    |                    | f = 650 MHz, L1 = 18 nH                     | -    | -    | -    | deg           |  |
|                    |                    | f = 740 MHz, L1 = 18 nH                     | -    | -    | -    | deg           |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH                    |      |      |      | deg           |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[1]</sup>     | -5.0 | -    | +5.0 | deg           |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH                    | -    | -    | -    | deg           |  |

[1] Guaranteed by device design; not tested in production.  
 [2] E-UTRA operating band 17 (734 MHz to 746 MHz).  
 [3] E-UTRA operating band 5 (869 MHz to 894 MHz).  
 [4] E-UTRA operating band 8 (925 MHz to 960 MHz).  
 [5]  $RL_{in}$  value can be increased by using a higher value for the series input matching inductor L1.  
 [6] PCB losses are subtracted.

**Table 9. Characteristics at  $V_{CC} = 2.8\text{ V}$**

$460\text{ MHz} \leq f \leq 960\text{ MHz}$ ,  $V_{CC} = 2.8\text{ V}$ ,  $V_{I(CTRL)} \geq 0.8\text{ V}$  and  $T_{amb} = 25\text{ }^\circ\text{C}$ . Input matched to  $50\ \Omega$  using application diagram figure 3 and component values as in table 10. Unless otherwise specified.

| Symbol           | Parameter          | Conditions                                      | Min  | Typ  | Max  | Unit |
|------------------|--------------------|---|------|------|------|------|
| <b>Gain mode</b> |                    |   |      |      |      |      |
| $I_{CC}$         | supply current     |   | 3.2  | 5.2  | 7.2  | mA   |
| $G_p$            | power gain         | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>          | 12.0 | 14.0 | 16.0 | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>          | 13.0 | 15.0 | 17.0 | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>      | 12.0 | 14.0 | 16.0 | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup>     | 11.5 | 13.5 | 15.5 | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | 11   | 13.0 | 15   | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup>     | 10.5 | 12.5 | 14.5 | dB   |
| $RL_{in}$        | input return loss  | f = 470 MHz, L1 = 18 nH <sup>[5]</sup>          | -    | 4.5  | -    | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH                         | -    | 12.5 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>          | -    | 11.5 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>         | -    | 8.0  | -    | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | -    | 12.0 | -    | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>         | -    | 14.0 | -    | dB   |
| $RL_{out}$       | output return loss | f = 470 MHz, L1 = 18 nH                         | -    | 9.5  | -    | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH                         | -    | 20.5 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>          | -    | 20.0 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>         | -    | 21.0 | -    | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | -    | 12.5 | -    | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>         | -    | 10.5 | -    | dB   |
| ISL              | isolation          | f = 470 MHz, L1 = 18 nH                         | -    | 28.0 | -    | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH                         | -    | 24.0 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>          | -    | 23.0 | -    | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>         | -    | 23.0 | -    | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>         | -    | 22.0 | -    | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>         | -    | 21.5 | -    | dB   |
| NF               | noise figure       | f = 470 MHz, L1 = 18 nH <sup>[1] [6]</sup>      | -    | 0.85 | 1.30 | dB   |
|                  |                    | f = 650 MHz, L1 = 18 nH <sup>[1] [6]</sup>      | -    | 0.90 | 1.35 | dB   |
|                  |                    | f = 740 MHz, L1 = 18 nH <sup>[1] [2] [6]</sup>  | -    | 0.95 | 1.40 | dB   |
|                  |                    | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2] [6]</sup> | -    | 0.85 | 1.3  | dB   |
|                  |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3] [6]</sup>     | -    | 0.85 | 1.3  | dB   |
|                  |                    | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4] [6]</sup> | -    | 0.85 | 1.3  | dB   |

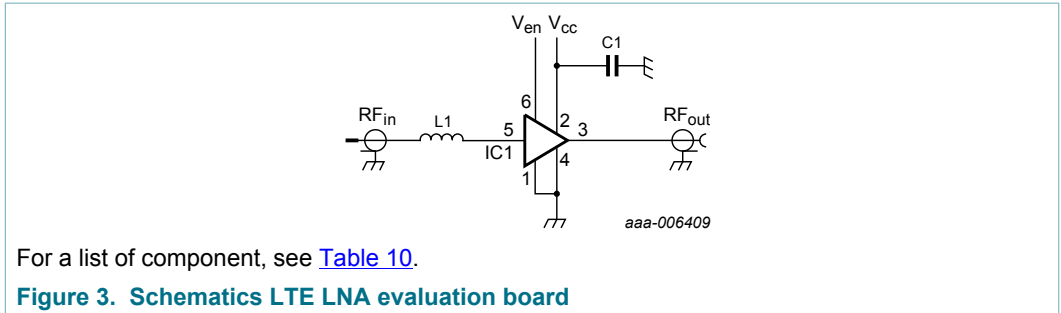
| Symbol              | Parameter                            | Conditions  | Min  | Typ  | Max | Unit |
|---------------------|--------------------------------------|---|------|------|-----|------|
| P <sub>I(1dB)</sub> | input power at 1 dB gain compression | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>                  | -8.5 | -4.5 | -   | dBm  |
|                     |                                      | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>                  | -7.5 | -3.5 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>              | -6.0 | -2.0 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup>             | -6.0 | -2.0 | -   | dBm  |
|                     |                                      | f = 882 MHz, L1 = 8.2 nH <sup>[1] [3]</sup>             | -5.0 | -1.0 | -   | dBm  |
|                     |                                      | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup>             | -4.5 | -0.5 | -   | dBm  |
| IP <sub>3i</sub>    | input third-order intercept point    | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>                  | -9.5 | -4.5 | -   | dBm  |
|                     |                                      | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>                  | -5   | 0.0  | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>              | -4.5 | +0.5 | -   | dBm  |
|                     |                                      | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup>             | -3.5 | +1.5 | -   | dBm  |
|                     |                                      | f = 882 MHz, L1 = 8.2 nH <sup>[1] [3]</sup>             | -3.5 | +1.5 | -   | dBm  |
|                     |                                      | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup>             | -3.5 | +1.5 | -   | dBm  |
| K                   | Rollett stability factor             |   | 1    | -    | -   |      |
| t <sub>on</sub>     | turn-on time                         | time from V <sub>I(CTRL)</sub> ON, to 90 % of the gain  | -    | -    | 2.1 | μs   |
| t <sub>off</sub>    | turn-off time                        | time from V <sub>I(CTRL)</sub> OFF, to 10 % of the gain | -    | -    | 0.3 | μs   |

| Symbol             | Parameter          | Conditions                                  | Min  | Typ  | Max  | Unit          |  |
|--------------------|--------------------|---|------|------|------|---------------|--|
| <b>Bypass mode</b> |                    |   |      |      |      |               |  |
| $I_{CC}$           | supply current     | $V_{I(CTRL)} < 0.3 \text{ V}$               | -    | -    | 1    | $\mu\text{A}$ |  |
| $G_p$              | power gain         | f = 470 MHz, L1 = 18 nH <sup>[1]</sup>      | -3.0 | -1.5 | 0.0  | dB            |  |
|                    |                    | f = 650 MHz, L1 = 18 nH <sup>[1]</sup>      | -4.0 | -2.5 | -1.0 | dB            |  |
|                    |                    | f = 740 MHz, L1 = 18 nH <sup>[1] [2]</sup>  | -4.5 | -3.0 | -1.5 | dB            |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH <sup>[1] [2]</sup> | -3.1 | -1.6 | -0.1 | dB            |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>     | -3.4 | -1.9 | -0.4 | dB            |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH <sup>[1] [4]</sup> | -3.5 | -2.0 | -0.5 | dB            |  |
| $RL_{in}$          | input return loss  | f = 470 MHz, L1 = 18 nH                     | -    | 13.0 | -    | dB            |  |
|                    |                    | f = 650 MHz, L1 = 18 nH                     | -    | 7.0  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>      | -    | 5.5  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>     | -    | 15.0 | -    | dB            |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>     | -    | 11.5 | -    | dB            |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>     | -    | 11.0 | -    | dB            |  |
| $RL_{out}$         | output return loss | f = 470 MHz, L1 = 18 nH                     | -    | 12.0 | -    | dB            |  |
|                    |                    | f = 650 MHz, L1 = 18 nH                     | -    | 8.0  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 18 nH <sup>[2]</sup>      | -    | 6.5  | -    | dB            |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH <sup>[2]</sup>     | -    | 13.0 | -    |               |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[3]</sup>     | -    | 11.5 | -    | dB            |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH <sup>[4]</sup>     | -    | 11.5 | -    | dB            |  |
| $\Delta\phi$       | phase variation    | between gain mode and bypass mode           |      |      |      |               |  |
|                    |                    | f = 470 MHz, L1 = 18 nH                     | -    | -    | -    | deg           |  |
|                    |                    | f = 650 MHz, L1 = 18 nH                     | -    | -    | -    | deg           |  |
|                    |                    | f = 740 MHz, L1 = 18 nH                     | -    | -    | -    | deg           |  |
|                    |                    | f = 740 MHz, L1 = 8.2 nH                    |      |      |      | deg           |  |
|                    |                    | f = 882 MHz, L1 = 8.2 nH <sup>[1]</sup>     | -5.0 | -    | +5.0 | deg           |  |
|                    |                    | f = 943 MHz, L1 = 8.2 nH                    | -    | -    | -    | deg           |  |

[1] Guaranteed by device design; not tested in production.  
 [2] E-UTRA operating band 17 (734 MHz to 746 MHz).  
 [3] E-UTRA operating band 5 (869 MHz to 894 MHz).  
 [4] E-UTRA operating band 8 (925 MHz to 960 MHz).  
 [5]  $RL_{in}$  value can be increased by using a higher value for the series input matching inductor L1.  
 [6] PCB losses are subtracted.

## 13 Application information

### 13.1 LTE LNA



**Table 10. List of components**

For schematics see, [Figure 3](#).

| Component | Description                    | Value     | Remarks                         |
|-----------|--------------------------------|-----------|---------------------------------|
| C1        | decoupling capacitor           | 1 $\mu$ F | to suppress power supply noise  |
| IC1       | BGS8L2                         | -         | NXP Semiconductors N.V.         |
| L1        | high-quality matching inductor | 18 nH     | 460 < f < 728 MHz Murata LQW15A |
|           |                                | 8.2 nH    | 728 < f < 960 MHz Murata LQW15A |

14 Package outline

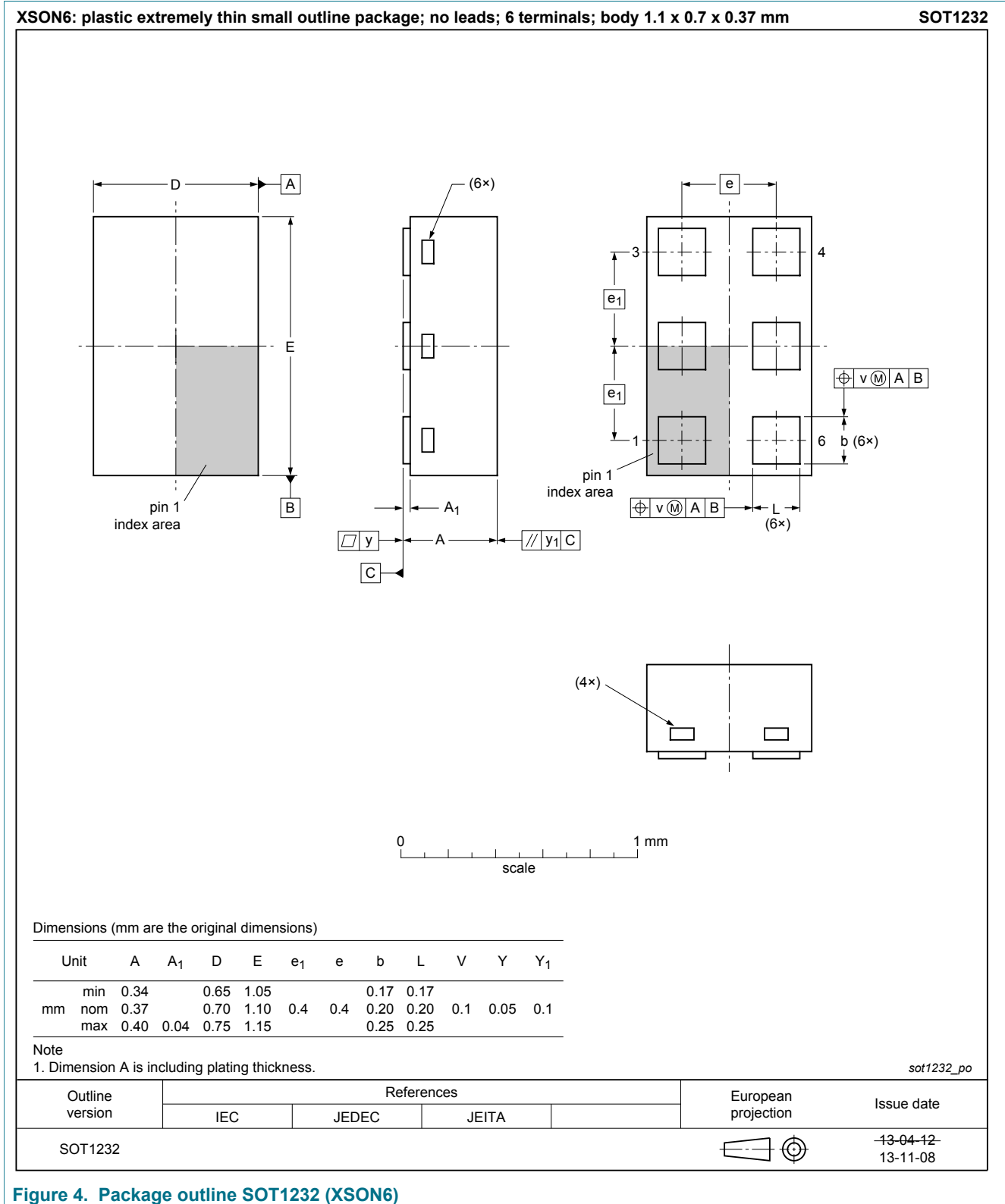


Figure 4. Package outline SOT1232 (XSON6)

## 15 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.

## 16 Abbreviations

**Table 11. Abbreviations**

| Acronym | Description                             |
|---------|---|
| ESD     | ElectroStatic Discharge                 |
| HBM     | Human Body Model                        |
| LTE     | Long-Term Evolution                     |
| MMIC    | Monolithic Microwave Integrated Circuit |
| PCB     | Printed-Circuit Board                   |
| SiGe:C  | Silicon Germanium Carbon                |

## 17 Revision history

**Table 12. Revision history**

| Document ID    | Release date  | Data sheet status  | Change notice | Supersedes |
|----------------|---|--------------------|---------------|------------|
| BGS8L2 v.6     | 20180629  | product data sheet | -             | BGS8L2 v.5 |
| Modifications: | changed $V_{I(CTRL)}$ Max ON state value to $V_{CC}$ at recommended operating conditions  |                    |               |            |
| BGS8L2 v.5     | 20171116  | product data sheet | -             | BGS8L2 v.4 |
| Modifications: | <ul style="list-style-type: none"> <li>• <a href="#">Table 8</a>: added conditions <math>f = 470</math> MHz, <math>f = 650</math> MHz, and <math>f = 740</math> MHz</li> <li>• <a href="#">Table 9</a>: added conditions <math>f = 470</math> MHz, <math>f = 650</math> MHz, and <math>f = 740</math> MHz</li> <li>• <a href="#">Table 10</a>: added value 18 nH</li> </ul> |                    |               |            |
| BGS8L2 v.4     | 20170117  | Product data sheet | -             | BGS8L2 v.3 |
| Modifications: | <ul style="list-style-type: none"> <li>• <a href="#">Section 1</a>: added LTE3001L according to our new naming convention</li> </ul>  |                    |               |            |
| BGS8L2 v.3     | 20160329  | Product data sheet | -             | BGS8L2 v.2 |
| Modifications: | <ul style="list-style-type: none"> <li>• <a href="#">Table 8 on page 5</a>: added maximum value in <math>G_p</math></li> <li>• <a href="#">Table 9 on page 6</a>: added minimum value in <math>P_{i(1dB)}</math></li> <li>• <a href="#">Table 9 on page 6</a>: added maximum value in <math>IP_{3i}</math></li> </ul>   |                    |               |            |
| BGS8L2 v.2     | 20160316  | Product data sheet | -             | BGS8L2 v.1 |
| Modifications: | <ul style="list-style-type: none"> <li>• added phase variation <a href="#">Table 8 on page 5</a> and <a href="#">Table 9 on page 6</a></li> </ul>   |                    |               |            |
| BGS8L2 v.1     | 20151221  | Product data sheet | -             | -          |

## 18 Legal information

### 18.1 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: 29 June 2018  
Document identifier: BGS8L2



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