



BGS8358

WLAN LNA + Switch

Rev. 4 — 18 January 2017

Product data sheet

1. General description

The BGS8358 is, also known as the WLAN3001C, a fully integrated Low Noise Amplifier and SP2T switch for transmit path. For WLAN applications in the 4.9 GHz to 5.925 GHz ISM band. The BGS8358 is manufactured using NXP's high performance QUBiC eighth generation SiGe:C technology. The BGS8358 couples best-in-class noise figure, linearity and low insertion loss CMOS switches with the process stability and ruggedness that are the hallmarks of SiGe technology. The BGS8358 has a 1.5 mm × 1.5 mm footprint HX2SON8 package and a thickness of 300 μm.

2. Features and benefits

- Intended for IEEE 802.11a/n/ac WLAN application
- Covers full ISM high band 4900 MHz to 5925 MHz
- Noise figure (NF) = 2.3 dB
- Gain 12.5 dB
- High input 1 dB compression point $P_{i(1dB)}$ of 0 dBm
- High in band IP_{3i} of 10 dBm
- Supply voltage 2.7 V to 5.25 V
- Standby mode current consumption at 8 μA for 3.3 V supply voltage
- Integrated concurrent 2.4 GHz notch filter
- 4 modes of operation (standby, high gain receive, bypass receive and transmit modes)
- Optimized performance at low supply current of 9.5 mA
- Integrated matching for input and output
- Requires only one supply decoupling capacitor
- ElectroStatic Discharge (ESD) protection on all pins (HBM > 2 kV)
- Small 8-pin leadless package 1.5 mm × 1.5 mm × 0.3 mm; 0.4 mm pitch

3. Applications

- IEEE 802.11a/n/ac WiFi, WLAN
- Smartphones, tablets, netbooks and other portable computing devices
- Access points, routers, gateways
- Wireless video
- General-purpose Industrial, Scientific and Medical (ISM) applications



4. Quick reference data

Table 1. Quick reference data

$V_{CC} = 3.3\text{ V}$; $T_{amb} = 25\text{ °C}$; $50\text{ }\Omega$ load, unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|--------------------------------------|------------------------|-------|------|------|---------|
| RF performance at ANT-RX path in high-gain receive mode [1] | | | | | | |
| I_{CC} | supply current | high-gain receive mode | - | 9.5 | 12.5 | mA |
| G_{tr} | transducer power gain | | 10 | 12.5 | 15 | dB |
| NF | noise figure | | - | 2.3 | - | dB |
| $P_{i(1dB)}$ | input power at 1 dB gain compression | in-band | - | 0 | - | dBm |
| RL_{in} | input return loss | | - | 12 | - | dB |
| RL_{out} | output return loss | | - | 10 | - | dB |
| RF performances at ANT-RX path in bypass receive mode [1] | | | | | | |
| I_{CC} | supply current | bypass receive mode | - | 8 | 15 | μ A |
| G_{tr} | transducer power gain | | -11.5 | -8 | -6 | dB |
| RF performance at ANT-TX path in transmit mode [1] | | | | | | |
| α_{ins} | insertion loss | | - | 0.75 | - | dB |

[1] See [Table 10](#) for the appropriate control signal settings

5. Ordering information

Table 2. Ordering information

| Type number | Package | | |
|-------------|---------|--|-----------|
| | Name | Description | Version |
| BGS8358 | HX2SON8 | plastic, thermal enhanced super thin small outline package; no leads; 8 terminals; body 1.5 x 1.5 x 0.3 mm | SOT1260-1 |

6. Marking

Table 3. Marking codes

| Type number | Marking code |
|-------------|-----------------------|
| BGS8358 | 58 |
| | YWW: Year & Week code |

7. Functional diagram

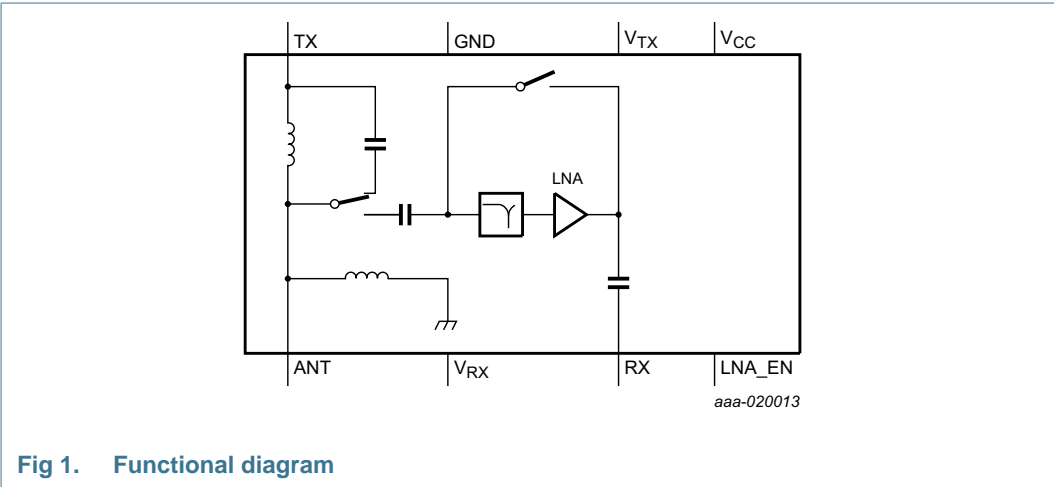


Fig 1. Functional diagram

8. Pinning information

8.1 Pinning

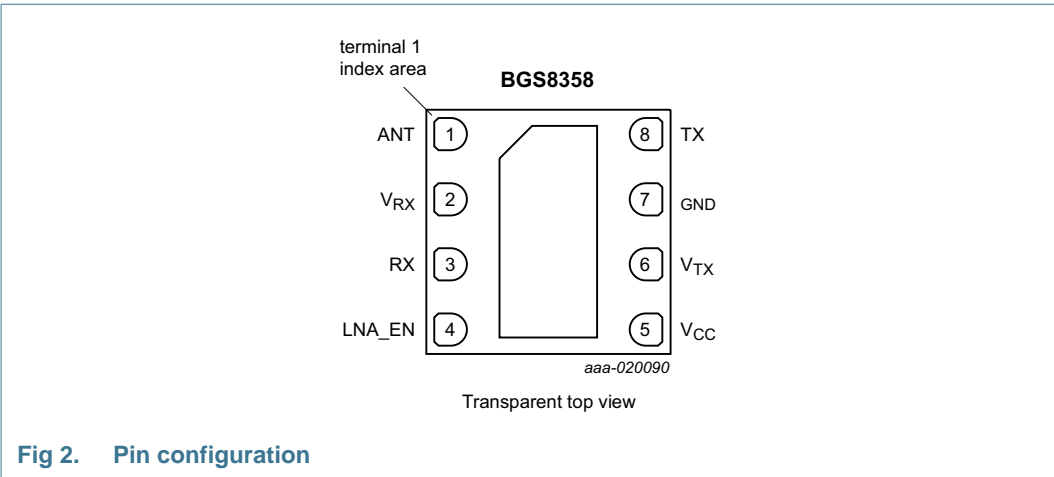


Fig 2. Pin configuration

8.2 Pin description

Table 4. Pin description

| Symbol | Pin | Description |
|--------|-----|------------------------|
| ANT | 1 | antenna input / output |
| VRX | 2 | receive mode control |
| RX | 3 | receive output |
| LNA_EN | 4 | LNA enable |
| VCC | 5 | supply voltage |

Table 4. Pin description ...continued

| Symbol | Pin | Description |
|-----------------|--------------------|-----------------------|
| V _{TX} | 6 | transmit mode control |
| GND | 7, exposed die pad | ground |
| TX | 8 | transmit input |

9. 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 | | -0.3 | 6 | V |
| I _{CC} | supply current | worst case up to P1dB | - | 21 | mA |
| V _{I(VRX)} | input voltage on pin VRX | see Figure 1 | -0.3 | 4 | V |
| V _{I(VTX)} | input voltage on pin VTX | see Figure 1 | -0.3 | 4 | V |
| V _{I(LNA_EN)} | input voltage on pin LNA_EN | | -0.3 | 4 | V |
| P _{I(ANT)} | input power-on pin ANT | high gain receive mode | - | 7 | dBm |
| | | bypass receive mode | - | 19 | dBm |
| P _{I(TX)} | input power-on pin TX | CW; transmit mode | - | 33 | dBm |
| T _{amb} | ambient temperature | | -40 | +85 | °C |
| T _{stg} | storage temperature | | -40 | +150 | °C |
| T _j | junction temperature | | -40 | +150 | °C |
| V _{ESD} | electrostatic discharge voltage | human body model [1] | - | ±2000 | V |
| | | charged device model [2] | - | ±500 | V |

[1] According to ANSI/ESDA/JEDEC standard JS-001.

[2] According to JEDEC standard JESD22-C101.

10. Recommended operating conditions

Table 6. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|--------------------------|---------------------|------|-----|------|------|
| f | frequency | | 4900 | - | 5925 | MHz |
| V _{CC} | supply voltage | | 2.7 | 3.3 | 5.25 | V |
| V _{IH} | HIGH-level input voltage | [1] | 1.8 | - | 3.6 | V |
| V _{IL} | LOW-level input voltage | | 0 | - | +0.4 | V |

[1] V_{IH} is the result of an input voltage on that specific pin between 1.8 V and V_{CC} - 0.2 V and 3.6 V maximum.

11. Thermal characteristics

Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|----------------------|---|------------|-----|------|
| R _{th(j-a)} | thermal resistance from junction to ambient | | 250 | K/W |

12. Characteristics

Table 8. DC Characteristics

$V_{CC} = 3.3\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $50\text{ }\Omega$ load, unless otherwise specified. All measurements done on application board (decoupling capacitor 100 nF placed near to V_{CC} pin 5) with SMA connectors as reference plane.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|-------------------------------|----------------------------|-----|-----|------|---------------|
| I_{CC} | supply current | high gain receive mode [1] | - | 9.5 | 12.5 | mA |
| | | bypass receive mode [1] | - | 8 | 15 | μA |
| | | transmit mode [1] | - | 150 | 300 | μA |
| | | standby mode [1] | - | 8 | 15 | μA |
| $I_{ctrl(LNA_EN)}$ | control current on pin LNA_EN | | - | 20 | 30 | μA |
| t_{on} | turn-on time | [2] | - | - | 400 | ns |
| t_{off} | turn-off time | [2] | - | - | 400 | ns |

[1] See Table 10 for the appropriate control signal settings.

[2] From any of three operating modes to another and from 10 % or 90 % of control signal edge to 90 % output level.

Table 9. RF Characteristics

$V_{CC} = 3.3\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $50\text{ }\Omega$ load, unless otherwise specified. All measurements done on application board (decoupling capacitor 100 nF placed near to V_{CC} pin 5) with SMA connectors as reference plane.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|--------------------------------------|--|-------|------|-----|------|
| RF performance at ANT-RX path in high-gain receive mode [1] | | | | | | |
| G_{tr} | transducer power gain | | 10 | 12.5 | 15 | dB |
| $G_{p(flat)}$ | power gain flatness | peak-to-peak over any 80 MHz band | - | - | 0.5 | dB |
| NF | noise figure | | - | 2.3 | - | dB |
| $P_{i(1dB)}$ | input power at 1 dB gain compression | in-band | - | 0 | - | dBm |
| $IP3_i$ | input third-order intercept point | 20 MHz tone spacing; $P_i = -20\text{ dBm}$ in band | - | 10 | - | dBm |
| RL_{in} | input return loss | | - | 12 | - | dB |
| RL_{out} | output return loss | | - | 10 | - | dB |
| RF performance at ANT-RX path in bypass receive mode [1] | | | | | | |
| G_{tr} | transducer power gain | | -11.5 | -8 | -6 | dB |
| $G_{p(flat)}$ | power gain flatness | peak-to-peak over any 80 MHz band | - | - | 0.5 | dB |
| $P_{i(1dB)}$ | input power at 1 dB gain compression | in-band | - | 13 | - | dBm |
| $IP3_i$ | input third-order intercept point | 20 MHz tone spacing; $P_i = -3\text{ dBm}$ in band | - | 27 | - | dBm |
| RL_{in} | input return loss | absolute value of the S_{11} parameter | - | 8 | - | dB |
| RL_{out} | output return loss | absolute value of the S_{22} parameter | - | 10 | - | dB |

Table 9. RF Characteristics ...continued
V_{CC} = 3.3 V; T_{amb} = 25 °C; 50 Ω load, unless otherwise specified. All measurements done on application board (decoupling capacitor 100 nF placed near to V_{CC} pin 5) with SMA connectors as reference plane.

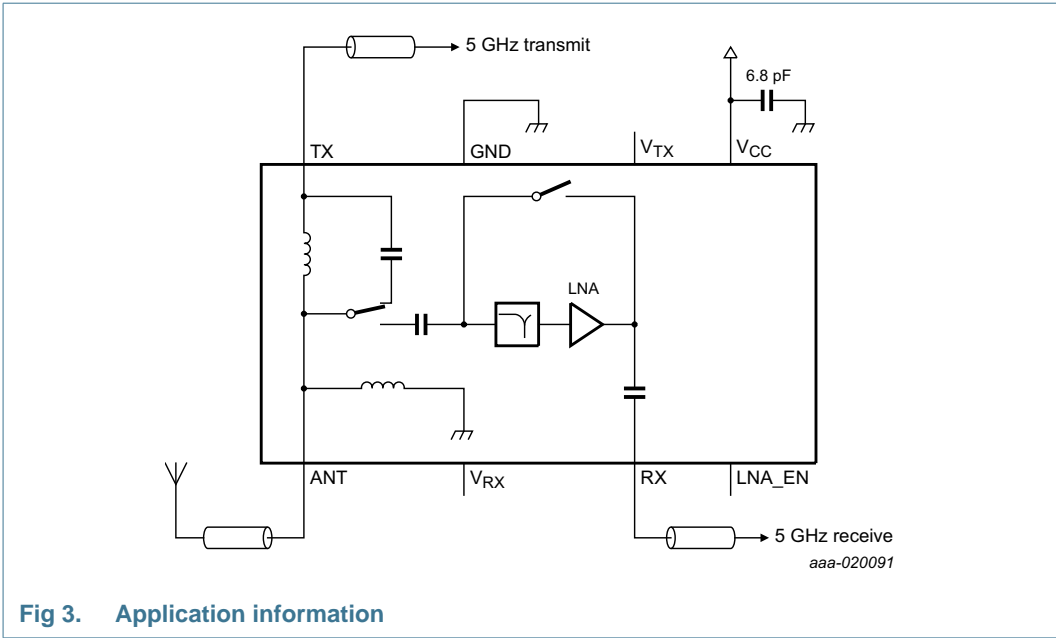
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|------------------------------------|-----|------|-----|------|
| RF performance at ANT-TX path in transmit mode ^[1] | | | | | | |
| α _{ins} | insertion loss | | - | 0.75 | - | dB |
| G _{p(flat)} | power gain flatness | peak-to-peak over any 80 MHz band | - | - | 0.2 | dB |
| ISL | isolation | measured between pin RX and pin TX | 28 | - | - | dB |
| P _{I(1dB)} | input power at 1 dB gain compression | in-band | - | 32 | - | dBm |
| RL _{in} | input return loss | | - | 15 | - | dB |
| RL _{out} | output return loss | | - | 20 | - | dB |

[1] See Table 10 for the appropriate control signal settings.

Table 10. Control signal truth table
Other modes than the ones given in this table are not allowed.

| Control signal setting ^[1] | | | Mode of operation | | | Mode name |
|---------------------------------------|-----------------|---------|-------------------|--------|-----|------------------------|
| V _{RX} | V _{TX} | LNA_EN | SP2T switch | | LNA | |
| (pin 2) | (pin 6) | (pin 4) | ANT-RX | ANT-TX | | |
| HIGH | LOW | HIGH | ON | OFF | ON | high-gain receive mode |
| HIGH | LOW | LOW | ON | OFF | OFF | bypass receive mode |
| LOW | HIGH | LOW | OFF | ON | OFF | transmit mode |
| LOW | LOW | LOW | OFF | OFF | OFF | standby mode |

13. Application information



14. Package outline

HX2SON8: plastic, thermal enhanced super thin small outline package; no leads;
8 terminals; body 1.5 x 1.5 x 0.3 mm

SOT1260-1

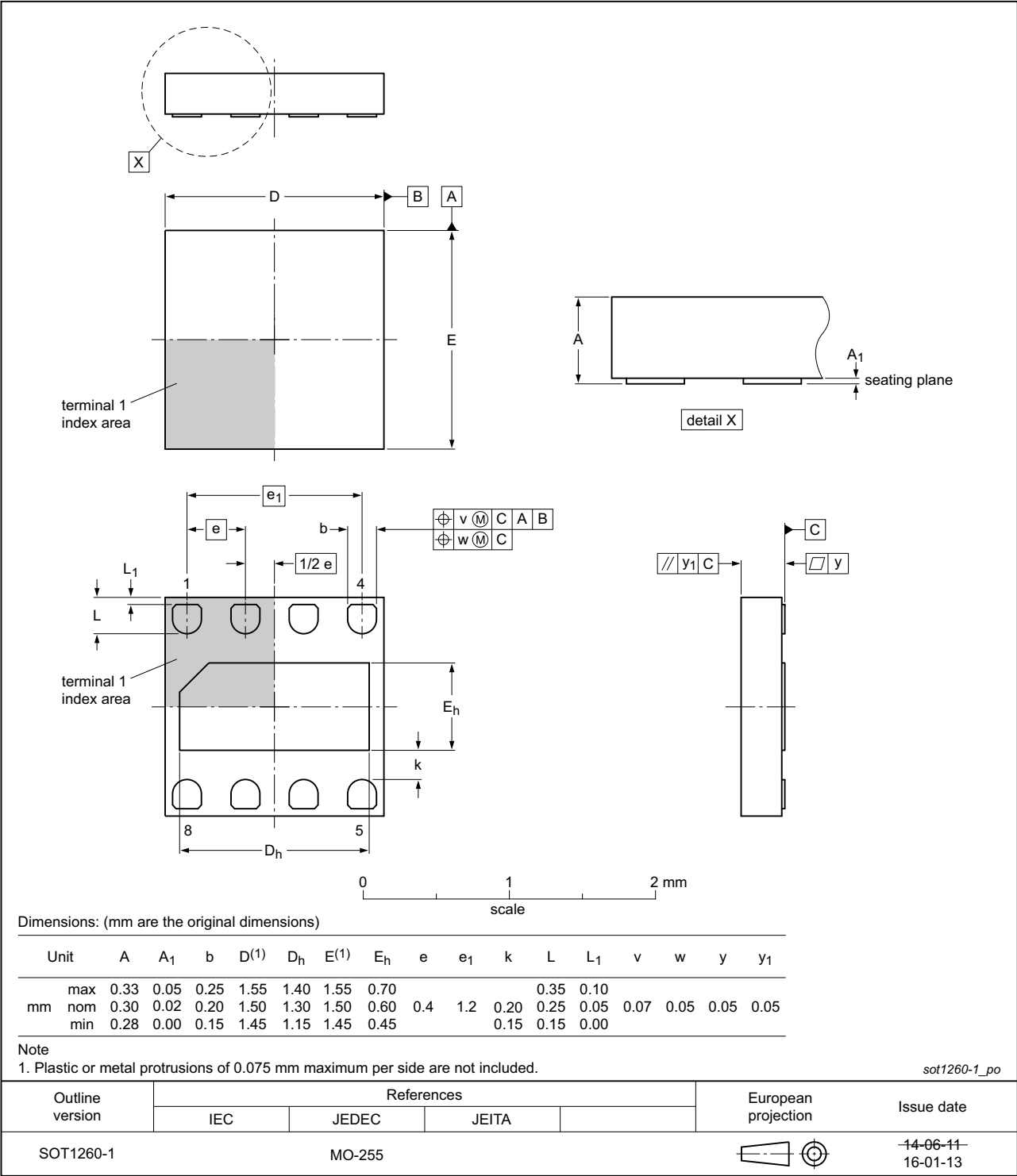


Fig 4. Package outline SOT1260-1 (HX2SON8)

15. Handling information

15.1 Moisture sensitivity

Table 11. Moisture sensitivity level

| Test methodology | Class |
|------------------|-------|
| JESD-22-A113 | 1 |

15.2 ElectroStatic Discharge (ESD)

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 12. Abbreviations

| Acronym | Description |
|---------|---|
| CMOS | Complementary Metal–Oxide Semiconductor |
| CW | Continuous Wave |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| ISM | Industrial, Scientific and Medical |
| LAN | Local Area Network |
| LNA | Low-Noise Amplifier |
| MMIC | Monolithic Microwave Integrated Circuit |
| SiGe:C | Silicon Germanium Carbon |
| SP2T | Single Pole 2 Throw |
| WLAN | Wireless Local Area Network |

17. Revision history

Table 13. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|------------------------|---------------|-------------|
| BGS8358 v.4 | 20170118 | Product data sheet | - | BGS8358 v.3 |
| Modifications: | Section 1 on page 1 : added WLAN3001C according to our new naming convention | | | |
| BGS8358 v.3 | 20161215 | Product data sheet | - | BGS8358 v.2 |
| Modifications: | <ul style="list-style-type: none"> Table 3 on page 2 extended table information | | | |
| BGS8358 v.2 | 20161115 | Product data sheet | - | BGS8358 v.1 |
| Modifications: | <ul style="list-style-type: none"> Table 1 on page 2: the typ value for RL_{out} has been changed to 10 dB Table 8 on page 5: the typ value for I_{CC} transmit mode has been changed to 150 μA Table 9 on page 5: the typ value for RL_{out} has been changed to 10 dB Table 9 on page 5: the min value for G_{tr} has been changed to -11.5 dB | | | |
| BGS8358 v.1 | 20151117 | Preliminary data sheet | - | - |

18. Legal information

18.1 Data sheet status

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|-----------------------------------|-------------------------------|---|
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| Product [short] data sheet | Production | This document contains the product specification. |

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

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20. Contents

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