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 NXPs 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 $IP3_i$ of 10 dBm
- Supply voltage 2.7 V to 5.25 V
- Standby mode current consumption at 8μA 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 V; T_{amb} = 25 °C; 50 Ω 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	μA
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

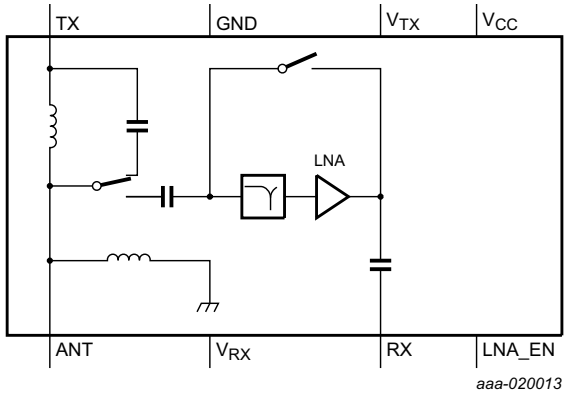


Fig 1. Functional diagram

8. Pinning information

8.1 Pinning

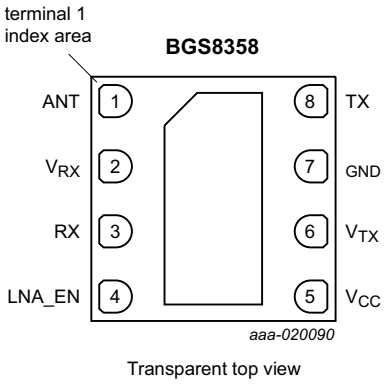


Fig 2. Pin configuration

8.2 Pin description

Table 4. Pin description

Symbol	Pin	Description
ANT	1	antenna input / output
V_{RX}	2	receive mode control
RX	3	receive output
LNA_EN	4	LNA enable
V_{CC}	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 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
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 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-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 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 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

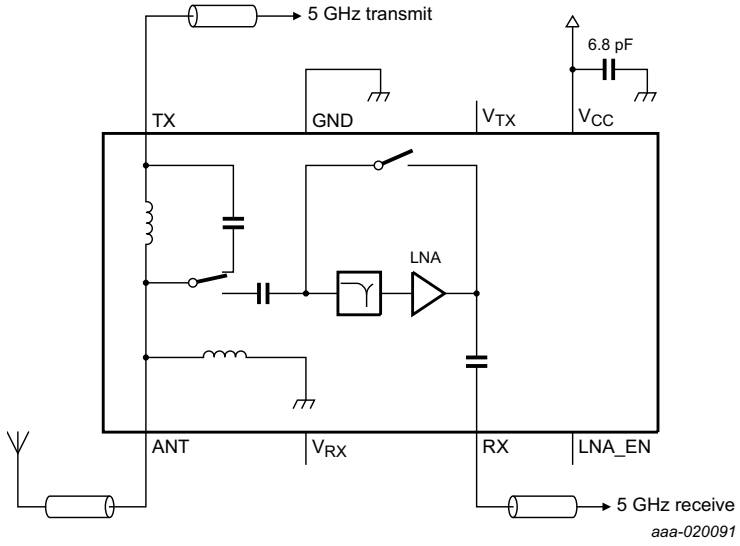
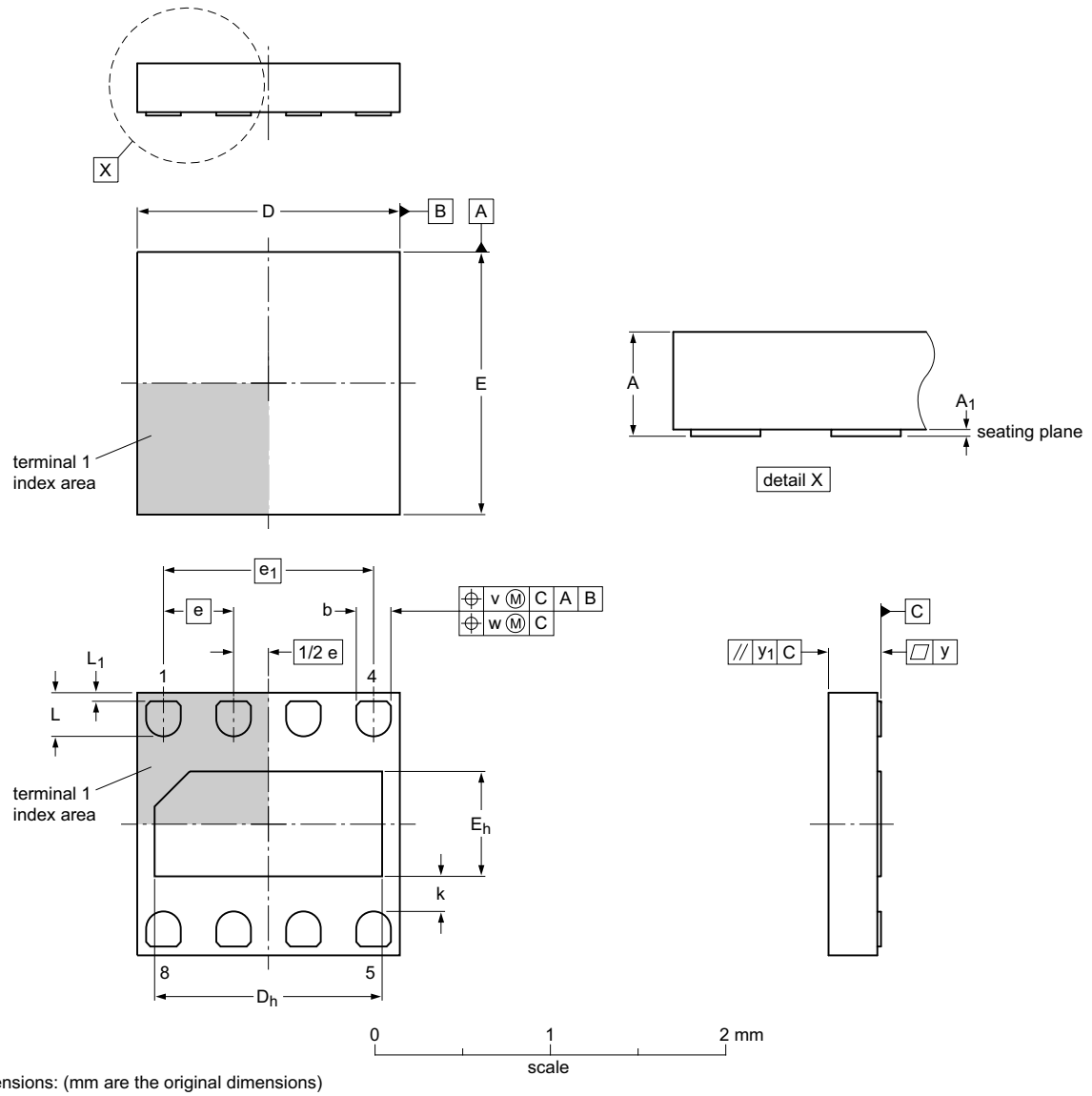


Fig 3. Application information

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**



Dimensions: (mm are the original dimensions)

Unit		A	A_1	b	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	e_1	k	L	L_1	v	w	y	y_1
	max	0.33	0.05	0.25	1.55	1.40	1.55	0.70				0.35	0.10				
mm	nom	0.30	0.02	0.20	1.50	1.30	1.50	0.60	0.4	1.2	0.20	0.25	0.05	0.07	0.05	0.05	0.05
	min	0.28	0.00	0.15	1.45	1.15	1.45	0.45			0.15	0.15	0.00				

Note
1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

sot1260-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1260-1		MO-255				~~14-06-11~~ 16-01-13

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:	• Table 3 on page 2 extended table information			
BGS8358 v.2	20161115	Product data sheet	-	BGS8358 v.1
Modifications:	• 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

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".

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20. Contents

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Date of release: 18 January 2017
Document identifier: BGS8358