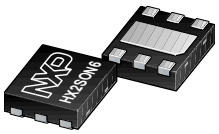


BGS8458

WLAN LNA + Switch

Rev. 2 — 24 September 2019 Product data sheet

1 General description

The BGS8458, also known as the WLAN3101C, is a fully integrated MMIC Low-Noise Amplifier and SP2T switch for transmit path. For WLAN applications in the 4.9 GHz to 5.925 GHz ISM band. Manufactured using high performance QUBiC eighth generation SiGe:C technology of NXP.

The BGS8458 couples best-in-class noise figure, linearity, efficiency, low insertion loss CMOS switches with the process-stability, and -ruggedness, that are the hallmarks of SiGe:C technology.

The BGS8458 has a 1.2 mm × 1.4 mm footprint HX2SON6 package and a maximum thickness of 330 µm.

2 Features and benefits

- Covers full ISM high band 4900 MHz to 5925 MHz
- Noise figure = 2.4 dB
- Gain 13.5 dB
- High input 1 dB compression point $P_{i(1dB)}$ of 0 dBm
- High out of band $IP3_i$ of 9 dBm
- Supply voltage 2.7 V to 5.25 V
- Bypass mode current consumption of 3.5 µA
- Optimized performance at low supply current of 10.7 mA
- Integrated concurrent 2.4 GHz notch filter
- 3 modes of operation (high gain receive, bypass receive, and transmit modes)
- Integrated matching for input and output
- Requires only one supply decoupling capacitor
- ESD protection on all pins (HBM > 2 kV)
- Small 6-pin leadless package 1.2 mm × 1.4 mm × 0.32 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 ISM applications

4 Quick reference data

Table 1. Quick reference data

V_{CC} = 3.6 V; T_{amb} = 25 °C; V_{IH} = 3.3 V; V_{IL} = 0 V; Z_S = Z_L = 50 Ω; P_i = -30 dBm unless otherwise specified. All measurements done on application board (DC-decoupling capacitor 100 pF placed near by the V_{CC} pin) with SMA connectors as reference plane.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RF performances at ANT-RX path in, high-gain receive mode [1]						
I_{CC}	supply current	high-gain receive mode [1]	-	10.7	13.0	mA
G_{tr}	transducer power gain		11.5	13.5	16	dB
NF	noise figure		-	2.4	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	in-band	-	0	-	dBm
RL_{in}	input return loss		-	16	-	dB
RL_{out}	output return loss		-	14	-	dB
RF performance at ANT-RX path in, bypass receive mode [1]						
I_{CC}	supply current	bypass receive mode [1]	-	3.5	8	µA
G_{tr}	transducer power gain		-9	-7	-5	dB
RF performance at ANT-TX path in, transmit mode [1]						
α_{ins}	insertion loss		-	0.7	-	dB

[1] See Table 11 for the appropriate control signal settings.

5 Ordering information

Table 2. Ordering information

Type number	Orderable part number	Package		
		Name	Description	Version
BGS8458	BGS8458Z	HX2SON6	plastic, thermal enhanced super thin small outline package; no leads; 6 terminals; body 1.2× 1.4 × 0.32 mm	SOT1234

6 Marking

Table 3. Marking code

Type number	Marking code
BGS8458	58
	YWW: Year & Week code

7 Functional diagram

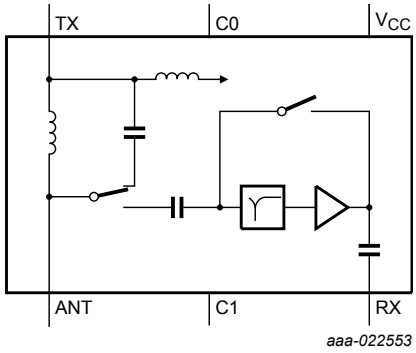
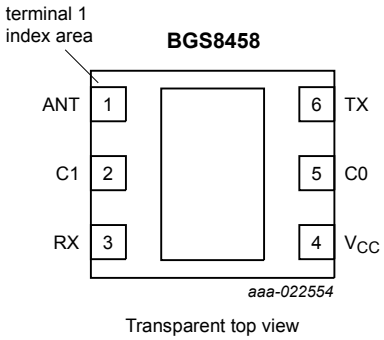


Figure 1. Functional diagram

8 Pinning information

8.1 Pinning



Transparent top view

Figure 2. Pin configuration

8.2 Pin description

Table 4. Pin description

Symbol	Pin	Description
ANT	1	antenna input / output
C1	2	C1 control pin
RX	3	receive output
V_{CC}	4	supply voltage
C0	5	C0 control pin
TX	6	transmit input
GND	exposed die pad	ground

9 Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Do not combine following conditions.

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.3	6	V
I_{CC}	supply current	worst case up to P_{1dB}, V_{CC} = 3.6 V	-	15	mA
$V_{I(C0)}$	input voltage pin C0	see Figure 1	-0.3	4	V
$V_{I(C1)}$	input voltage pin C1	see Figure 1	-0.3	4	V
$P_{i(ANT)}$	input power pin ANT	high-gain receive mode	-	7	dBm
		bypass receive mode	-	19	dBm
$P_{i(TX)}$	input power pin TX	continuous wave; transmit mode	-	33	dBm
T_{amb}	ambient temperature	air temperature	-40	+85	°C
T_{stg}	storage temperature		-40	+140	°C
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM) according to ANSI/ESDA/JEDEC standard JS-001	-	±2000	V
		Charged Device Model (CDM) according to JEDEC standard JESD22-C101	-	±500	V

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	3.6	5.25	V
V_{IH}	HIGH-level input voltage	[1]	1.62	-	3.6	V
V_{IL}	LOW-level input voltage		0	-	+0.4	V

[1] Input voltage V_{IH} on that specific pin between 1.62 V and V_{CC1} - 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} = 3.6 V; T_{amb} = 25 °C; V_{IH} = 3.3 V; V_{IL} = 0 V; Z_S = Z_L = 50 Ω; P_i = -30 dBm unless otherwise specified. All measurements done on application board (DC-decoupling capacitor 100 pF placed near by the V_{CC} pin) with SMA connectors as reference plane

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CC}	supply current	high-gain receive mode [1]	-	10.7	13.0	mA
		bypass receive mode [1]	-	3.5	8	µA
		transmit mode [1]	-	150	300	µA
$I_{ctrl(C0)}$	control current on pin C0		-	10	15	µA
$I_{ctrl(C1)}$	control current on pin C1		-	4	10	µA

[1] See Table 11 for the appropriate control signal settings.

Table 9. Transient characteristics

V_{CC} = 3.6 V; T_{amb} = 25 °C; V_{IH} = 3.3 V; V_{IL} = 0 V; Z_S = Z_L = 50 Ω; P_i = -30 dBm unless otherwise specified. All measurements done on application board (DC-decoupling capacitor 100 pF placed near by the V_{CC} pin) with SMA connectors as reference plane

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{on}	turn-on time	[1]	-	-	500	ns
t_{off}	turn-off time	[1]	-	-	400	ns

[1] From any of three operating modes to another and from within 10 % of the initial gain to within 10 % of the final gain.

Table 10. RF characteristics

V_{CC} = 3.6 V; T_{amb} = 25 °C; V_{IH} = 3.3 V; V_{IL} = 0 V; Z_S = Z_L = 50 Ω; P_i = -30 dBm unless otherwise specified. All measurements done on application board (DC-decoupling capacitor 100 pF placed near by the V_{CC} pin) 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		11.5	13.5	16	dB
$G_{p(flat)}$	power gain flatness	peak-to-peak over any 80 MHz band	-	-	0.5	dB
NF	noise figure		-	2.4	-	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 per tone	-	9	-	dBm
RL_{in}	input return loss		-	16	-	dB
RL_{out}	output return loss		-	14	-	dB

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RF performance at ANT-RX path in, bypass receive mode[1]						
G_{tr}	transducer power gain		-9	-7	-5	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	-	17	-	dBm
$IP3_i$	input third-order intercept point	20 MHz tone spacing; P_i = -3 dBm per tone	-	29	-	dBm
RL_{in}	input return loss		-	10	-	dB
RL_{out}	output return loss		-	10	-	dB
RF performance at ANT-TX path in transmit mode [1]						
α_{ins}	insertion loss		-	0.7	-	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	-	30	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	in-band	-	32	-	dBm
RL_{in}	input return loss		-	13	-	dB
RL_{out}	output return loss		-	13	-	dB

[1] See Table 11 for the appropriate control signal settings.

Table 11. 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_{C0}	V_{C1}	SP2T switch		LNA	
(pin 5)	(pin 2)	ANT-RX	ANT-TX		
LOW	HIGH	ON	OFF	ON	high-gain receive mode
LOW	LOW	ON	OFF	OFF	bypass receive mode
HIGH	LOW	OFF	ON	OFF	transmit mode

[1] A logic LOW is the result of an input voltage on that specific pin between 0 V and 0.5 V.
A logic HIGH is the result of an input voltage on that specific pin between 1.62 V and V_{CC1} - 0.2 V and 3.6 V maximum.

13 Application information

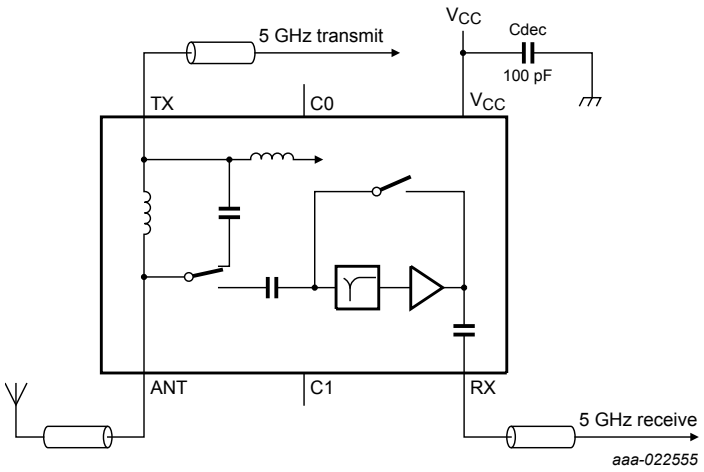
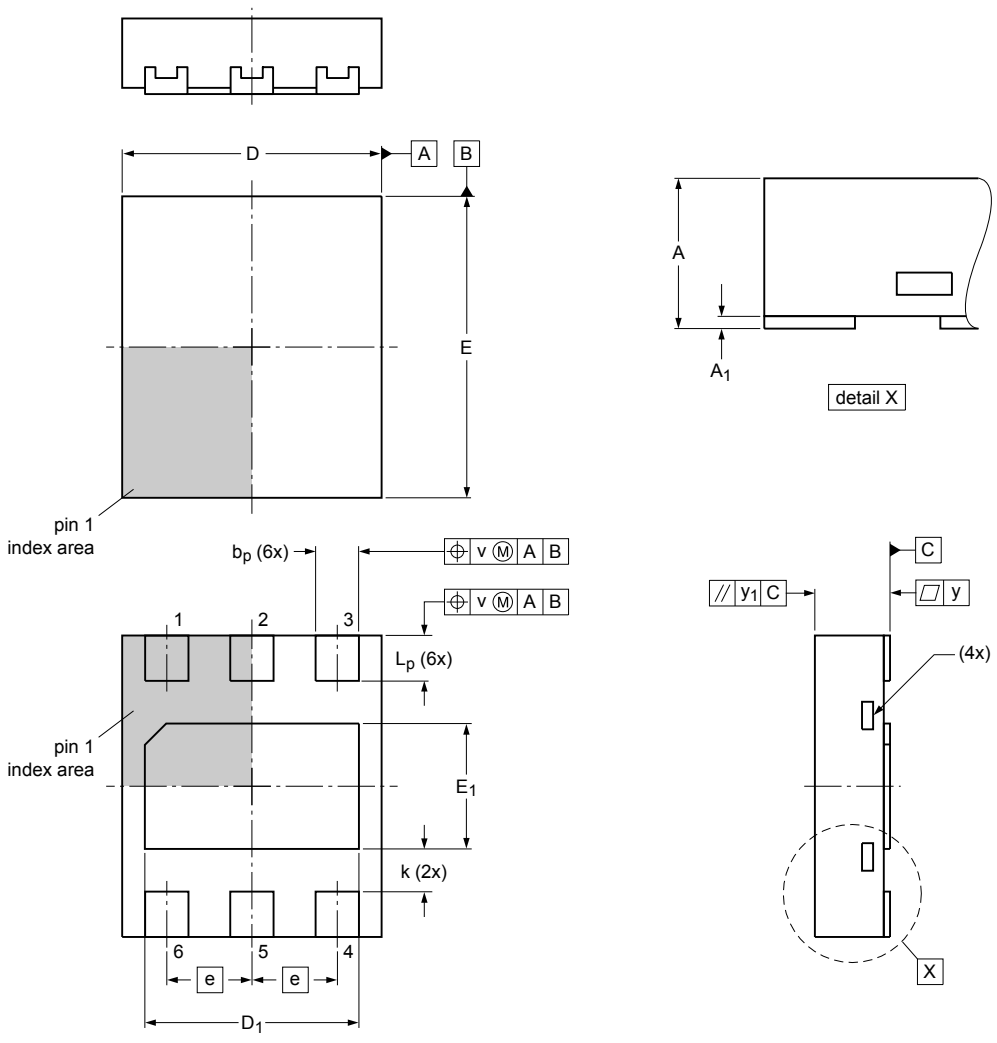


Figure 3. Application information

14 Package outline

HX2SON6: plastic, thermal enhanced super thin small outline package; no leads; 6 terminals; body 1.4 x 1.2 x 0.32 mm **SOT1234**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b_p	D	D_1	E	E_1	e	L_p	k	v	y	y_1
mm	max	0.33	0.015	0.22	1.25	1.05	1.45	0.65		0.225				
	nom	0.32	0.010	0.20	1.20	1.00	1.40	0.60	0.4	0.210		0.1	0.05	0.1
	min	0.30	0.000	0.18	1.15	0.95	1.35	0.55		0.195	0.2			

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

sot1234_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1234						~~16-09-05~~ 16-11-29

Figure 4. Package outline SOT1234 (HX2SON6)

15 Handling information

15.1 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.

15.2 Moisture sensitivity

Table 12. Moisture sensitivity level

Test methodology	Class
JESD-22-A113	1

16 Abbreviations

Table 13. 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
SMA	SubMiniature version A
SP2T	single pole 2 throw
WLAN	wireless local area network

17 Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGS8458 v.2	20190924	Product data sheet	-	BGS8458 v.1.1
modification	changed status from company confidential to public			
BGS8458 v.1.1	20181214	Product data sheet	-	BGS8458 v.1

Document ID	Release date	Data sheet status	Change notice	Supersedes
modification	• modified Ordering information with Orderable part number			
BGS8458 v.1	20170505	Product 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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