

OWLAN211b i/x™

cB-0904

Electrical & Mechanical Datasheet

connectBlue

OWLAN211b i/x™
cB-0904

Electrical & Mechanical Datasheet

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1 Introduction

1.1 Related Documents

There are some documents related to the OWLAN211b i/x module (see Figure 1):

- The **OWLAN211b User Manual** contains information on how to use the OWLAN211b module. Study this document before moving on to the others.
- The **OWLAN211b Host Driver Documentation** contains description of the Host driver and it's requirements.
- The **OWLAN211b Electrical & Mechanical Datasheet** (this document) contains important information about the OWLAN211b module. Read this document if you plan to mount the OWLAN211b module on your design.

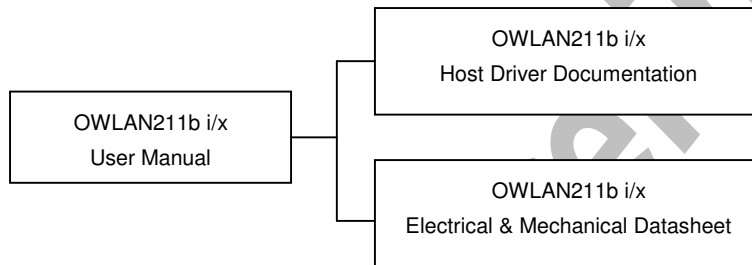


Figure 1: CB-OWLAN211b documents

1.2 Product Variants

This Electrical and Mechanical datasheet contains information about the variants of OWLAN211b modules based on the PCB cB-0904.

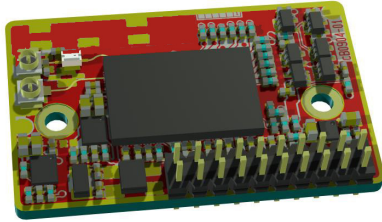
This document makes references to the OWLAN Module ID, not the Product Name (see Table 1).

Table 1: Product variants

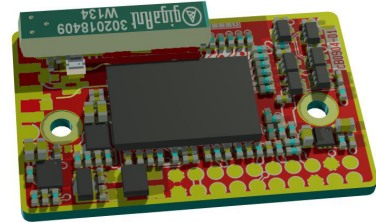
	Product Name	Module ID / FCC ID	WLAN Type	Description
Internal antenna	CB-OWLAN211b i-02	cB-0095-01 PVH090402	11 Mbit DSSS 16 dBm (40 mW)	OWLAN211b with internal antenna, 2mm pin connector
	CB-OWLAN211b i-04	cB-0096-01 PVH090402	11 Mbit DSSS 16 dBm (40 mW)	OWLAN211b with internal antenna, no pin connector Note: Not available from stock
External antenna	CB-OWLAN211b x-02	cB-0097-01 PVH090402	11 Mbit DSSS 16 dBm (40 mW)	OWLAN211b with external antenna, 2mm pin connector. Receive diversity supported.
	CB-OWLAN211b x-04	cB-0098-01 PVH090402	11 Mbit DSSS 16 dBm (40 mW)	OWLAN211b with external antenna, no pin connector. Receive diversity supported. Note: Not available from stock

1.2.1 cB-0904

cB-0904 is a small size WLAN module based on the Phillips BGW200 system in package (SiP). The modules are available in many different antenna combinations. See Picture 1 – 2 for some of the available models. All models are described in Table 1.



Picture 1: CB-OWLAN211b x-02 Module with 2 external antenna connectors and 2mm pin connector



Picture 2: CB-OWLAN211bi-04 Module with internal antenna

Preliminary

1.3 Block Diagram cB-0904

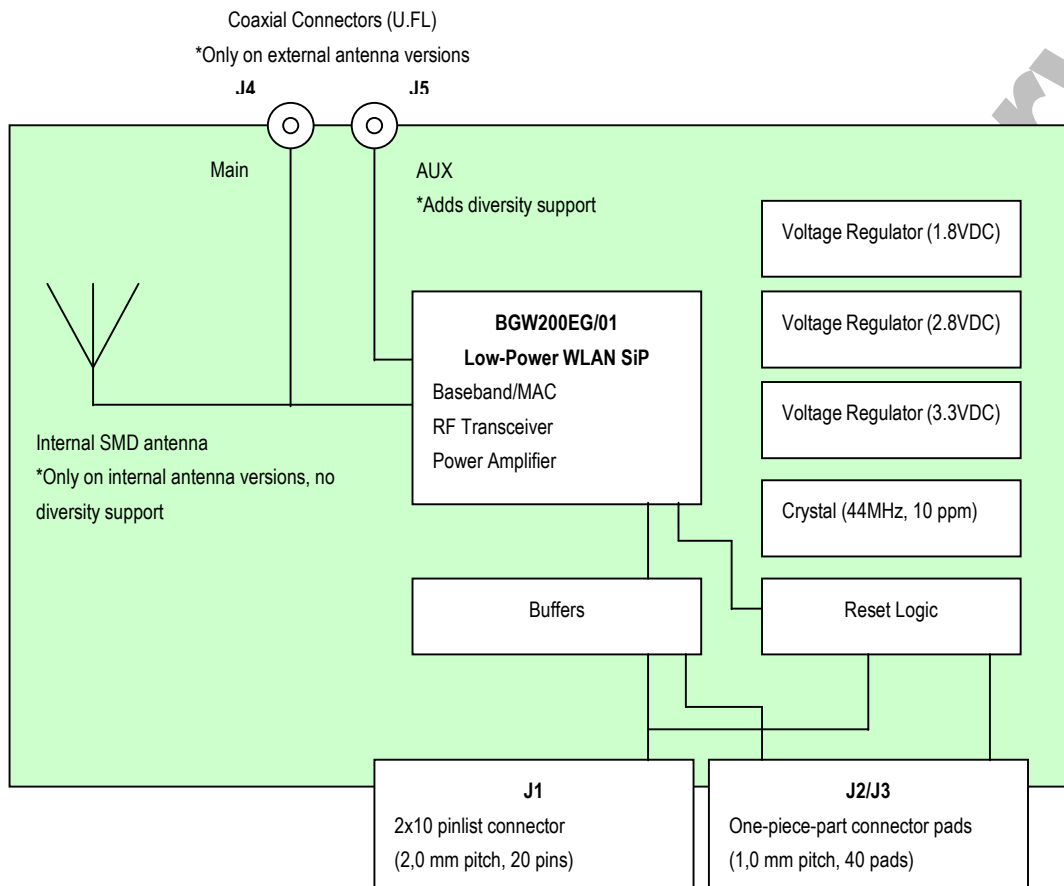
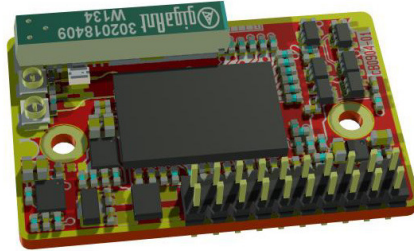


Figure 2: Block diagram of cB-0904

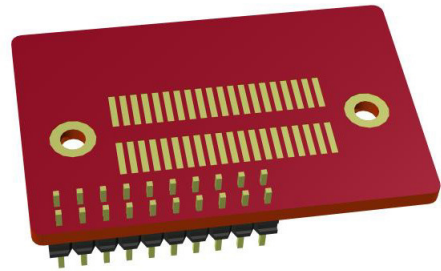
2 Electrical Interface and Connectors

This section describes the signals available on the module interface connectors. There are two ways to connect to the OWLAN211b module:

- Via the 2x10-pin 2mm header connector J1 (see Picture 3).
- Via the 2x20-pin 1mm pitch board-to-board (one piece part) connectors, J2 through J3. The J2 to J3 connectors on the OWLAN211b module exist on the module only as a mating PCB-layout pattern (see Picture 4).



Picture 3: 2x20 2mm pinlist connector, J1.



Picture 4: 1-mm pitch board-to-board connector, J2 and J3.

2.1 Pin Numbering

2.1.1 J1, J4, and J5 Connectors

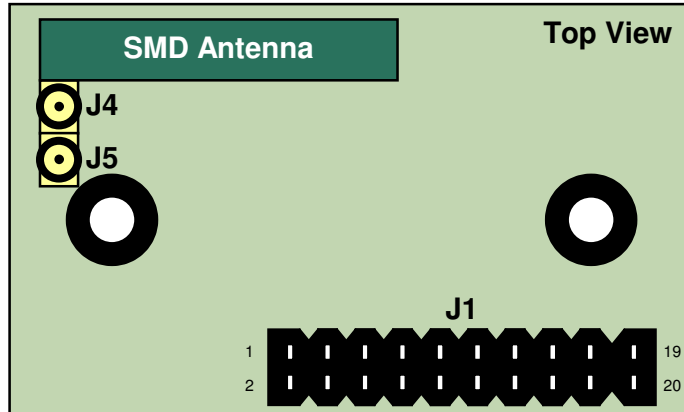


Figure 3: Top view of the PCB with the pinning of the J1 connector.

2.1.2 J2 and J3 Connectors

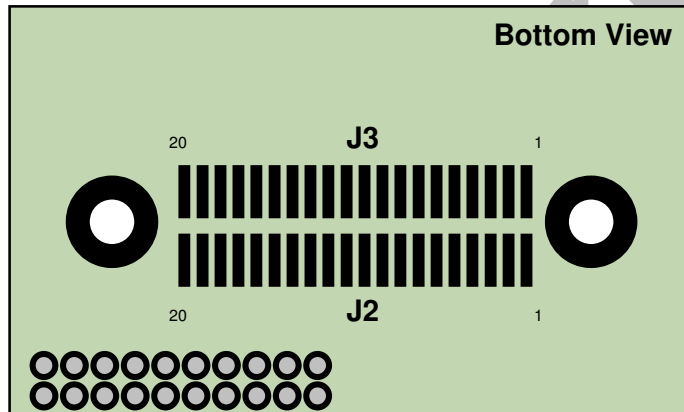


Figure 4: Bottom view of the PCB with the pinning of the J2 and J3 pads connector.

2.2 Pin Description

2.2.1 J1 Connector

Table 2: Signals on J1

J1 Pin Nr	Pin Name	Signal Name	Signal Level	Type	Description
1, 2, 16, 17	VSS	VSS	Ground	Power/Signal	Power supply 0V-terminal and signal return path
3, 4, 15	VCC_3V3	+Vin	3.3V – 5 V	Power	Power supply positive terminal
5 – 9					Reserved for future use, do not connect
10	RESET	Hardware reset	CMOS	I	Active low. Internal pull-up 56kΩ
11 –12					Reserved for future use, do not connect
13	MOSI	SPI - MOSI	CMOS	I	SPI: MOSI (Master Output – Slave Input)
14	SPI-SS-n	SPI-SS-n / SPI - CS0	CMOS	I	SPI: CS (Chip Select)
18	SPI-CLK	SPI-CLK	CMOS	I	SPI clock input. Max frequency for SPI is 66MHz
19	SPI-ExInt	SPI - ExInt	CMOS	O	SPI: Interrupt
20	MISO	SPI - MISO	CMOS	O	SPI: MISO (Master Input – Slave Output)

2.2.2 J2 Connector

Table 3: Signals on J2

J2 Pin Nr	Pin Name	Signal Name	Signal Level	Type	Description
1, 2	VSS	VSS	Ground	Power/ Signal	Power supply 0V-terminal and signal return path
3, 4	VCC_3V3	+Vin	3.3V	Power	Power supply positive terminal
5 – 20					Reserved for future use, do not connect.

2.2.3 J3 Connector

Table 4: Signals on J3

J3 Pin Nr	Pin Name	Signal Name	Signal Level	Type	Description
6	SPI-SS-n	SPI-SS-n / SPI – CS0	CMOS	I	SPI: CS (Chip Select)
7	MOSI	SPI - MOSI	CMOS	I	SPI: MOSI (Master Output – Slave Input)
8	VSS	Ground	Ground	Power/Signal	Power supply 0V-terminal and signal return path
11	SPI-CLK	SPI - CLK	CMOS	I	SPI clock input Max frequency for SPI is 66MHz
12	VSS	Ground	Ground	Power/Signal	Power supply 0V-terminal and signal return path
13	MISO	SPI - MISO	CMOS	O	SPI: MISO (Master Input – Slave Output)
14	SPI-ExInt	SPI - ExInt	CMOS	O	SPI: Interrupt
15	PRI		CMOS	I	Bluetooth co-existence: BT high priority traffic indicator
16	BT		CMOS	I	Bluetooth co-existence: BT arbitration signal
17	WL		CMOS	O	Bluetooth co-existence: WLAN arbitration signal
18	RXIND		CMOS	O	Bluetooth co-existence: WLAN receive indicator
19	RESET	Hardware reset	CMOS	I	Active low. Internal pull-up 56kΩ
1 – 5, 9, 10, 20					Reserved for future use, do not connect.

2.2.4 J4 External Main Antenna Connector

J4 is the main antenna connector. It is used for both transmit and receive.

This connector has a normalized 50Ω impedance and can be connected directly to an external antenna with a 50Ω transmission line.

Table 5: Signals on J4

J4 Pin Nr	Pin Name	Signal Name	Signal Level	Type	Description
1	AntMain	AntMain	RF	I/O	Main antenna port (50Ω)

Note: this connector is only available on the CB-OWLAN211bx-02/04

2.2.5 J5 External Auxiliary Antenna Connector

J5 is the auxiliary antenna connector. It is used only for receiving and if the unit is configured for diversity mode. The unit never transmits data using this antenna connector.

This connector has a normalized 50 Ω impedance and can be connected directly to an external antenna with a 50 Ω transmission line.

Table 6: Signals on J5

J4 Pin Nr	Pin Name	Signal Name	Signal Level	Type	Description
1	AntAux	AntAux	RF	I	Auxiliary antenna port (50 Ω)

Note: this connector is only available on the CB-OWLAN211bx-02/04

2.3 Characteristics

2.3.1 Power supply

Table 7: Power supply

Symbol	Parameter		Value	Unit
VCC_3V3	Power supply	Min	3.3	V
		Max	5.0	V

Table 8: Current consumption

Symbol	Mode		Value	Unit
ICC @ VCC 4.0V	Reset	Average	20	μA
	Idle, firmware not loaded	Average	24	mA
	Idle, active mode	Average	157	mA
	Connected, active mode	Average	160	mA
	Connected, sleep mode	Average	3	mA
	Connected, active mode, data transfer	Max	350	mA
	Connected, sleep mode, data transfer	Max	350	mA

2.3.2 Input/Output signals

Table 9: Input/output signals

Symbol	Parameter	Value	Unit
V _{IN} Low	Logic LOW level input voltage on all logic	Min	-0.3 V
		Max	0.85 V
V _{IN} High	Logic HIGH level input voltage	Min	2.1 V
		Max	3.3 V
V _{OUT} Low	Logic LOW level output voltage	Max	0.4 V
V _{OUT} High	Logic HIGH level output voltage	Min	2.5 V
I _{GPIO}	Sink and source current	Max	4 mA
C _{GPIO}	Input capacitance	Typ	8 pF
V _{thl(POR)}	Lower Power-on reset threshold voltage	Typ	0.4 V
V _{thh(POR)}	Upper Power-on reset threshold voltage	Typ	2 V

Note: MOSI, SPI-CLK and SPI-SS are 5 V tolerant

2.3.3 Environmental

Table 10: Temperatures characteristics

Parameter		Product Variant	Value	Unit
Storage temperature	Min	CB-OWLAN211b i/x-02 CB-OWLAN211b i/x-04	-40	°C
	Max	CB-OWLAN211b i/x-02 CB-OWLAN211b i/x-04	+125	°C
Operating temperature	Min	CB-OWLAN211b i/x-02 CB-OWLAN211b i/x-04	-30	°C
	Max	CB-OWLAN211b i/x-02 CB-OWLAN211b i/x-04	+85	°C

2.4 Hardware Reset

A hardware reset input is available on the J1 and J3 connectors (see section 2.1). An external reset source must be open drain or collector. The RESET pin is pulled-up internally with 56k Ω .

See example in A.2.2

2.5 Power Control

The CB-OWLAN211b module can be put in one of four power modes.

- Active mode – no power saving is done.
- Sleep mode – power saving. The module is held in low power mode and only listens and responds to beacons.
- Powers save mode – Maximum power save. The device is incapable of transmitting or receiving data.
- Reset mode – The RESET pin is held down. As long as the RESET pin is held low the internal power regulators are shut off. This will ensure maximum power save.

3 Antennas

There are 2 different antenna options available:

- An internal surface mounted (SMD) antenna.
- An “external antenna” should be connected to a U.FL connector. Many different “external antennas” are available.

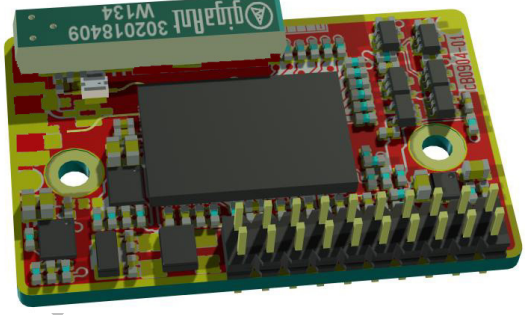
See section 4.1 for more information on antenna placement.

This chapter gives an overview of the qualities of the different antenna options.

3.1 Surface Mounted Antenna (internal)

The unit cannot be mounted in a metal-shielded enclosure with this antenna.

Part Number	OWLAN211i
Antenna name	Mica 2.4 GHz
Manufacture	gigaAnt
Polarization	Linear
Gain (Typ)	2.5 dBi
Antenna Size (LxWxH)	20.5x3.6x3.3 mm
Comment	The antenna gain is dependent of the mounting of the module. See section 4.4 for mounting the module considering the antenna.



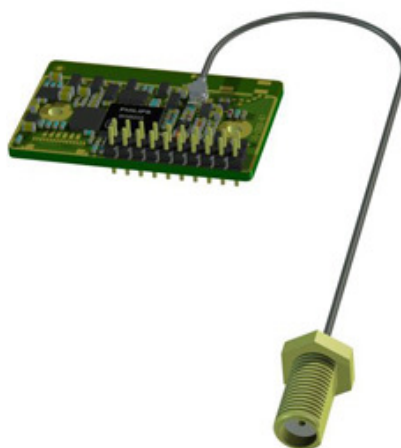
3.2 External antennas

The external antennas are connected to the board through a U.FL connector. Some of the antennas are connected directly to the U.FL connector of the board and some are connected using an SMA connected through a short U.FL to SMA adapter cable.

Note: Antennas with SMA connectors are not approved for use in USA or Canada due to FCC regulations.

3.2.1 Antenna Accessories

Part Number	cB-ACC-18
Name	U.FL to SMA adapter cable
Connector	U.FL and SMA female
Cable length	120 mm
Cable loss	Less than 0.5dBm



Comment	The SMA connector may be mounted in a panel.
Approval	Not approved for use in the US and Canada.

3.2.2 Antennas

Part Number	cB-ACC-16
Name	WCR-2400-SMA
Manufacture	Centurion
Type	1/2 wave dipole
Polarization	Vertical
Gain	+2.5dBi
Size	100 mm
Connector	SMA male



Comment	To be mounted on the U.FL to SMA adapter cable.
Approval	Not approved for use in the US and Canada.

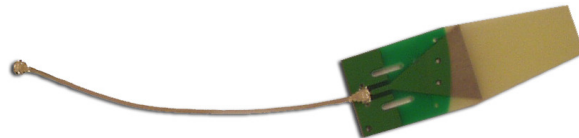
Part Number	cB-ACC-27
Name	WCR-2400-IP04
Manufacture	Centurion
Type	½ wave dipole
Polarization	Vertical
Gain	+2.0dBi
Size	108 mm (Straight)
Connector	U.FL connector
Comment	To be mounted on the U.FL connector on the PCB.
Approval	Approved for use in the US and Canada



Part Number	cB-ACC-17
Name	Reel planTec Bluetooth m70
Manufacture	Reel
Size (ØxH)	75x20 mm
Gain	+1dBi
Mounting	M16x13.6 mm
Cable length	3 m
Connector	SMA male
Other info	Waterproof (IP67)
Comment	To be mounted on the U.FL to SMA adapter cable.
Approval	Not approved for use in the US and Canada



Part Number	cB-ACC-19
Name	Microblue CAP24235
Manufacture	Centurion
Type	Microstrip
Polarization	Linear
Gain	+1.5dBi
Size	21x60 mm
Cable length	200 mm
Connector	U.FL
Comment	Connected directly to the U.FL connector on OEM board.
Approval	Approved for use in the US and Canada



Part Number	cB-ACC-23
Name	Mobile Mark Stub
Manufacture	Mobile Mark Communications Antennas
Type	¼ wave dipole
Polarization	Vertical
Gain	0 dBi
Connector	SMA male
Comment	To be mounted on the U.FL to SMA adapter cable
Approval	Not approved for use in the US and Canada



Part Number	cB-ACC-21
Name	Rugged SMA
Manufacture	Radiall/Larsen
Type	½ wave dipole
Polarization	Vertical
Gain	2 dBi
Connector	SMA male
Comment	To be mounted on the U.FL to SMA adapter cable
Approval	Not approved for use in the US and Canada



Preliminary

4 Mounting Information

4.1 Board Outlines

4.1.1 cB-0904

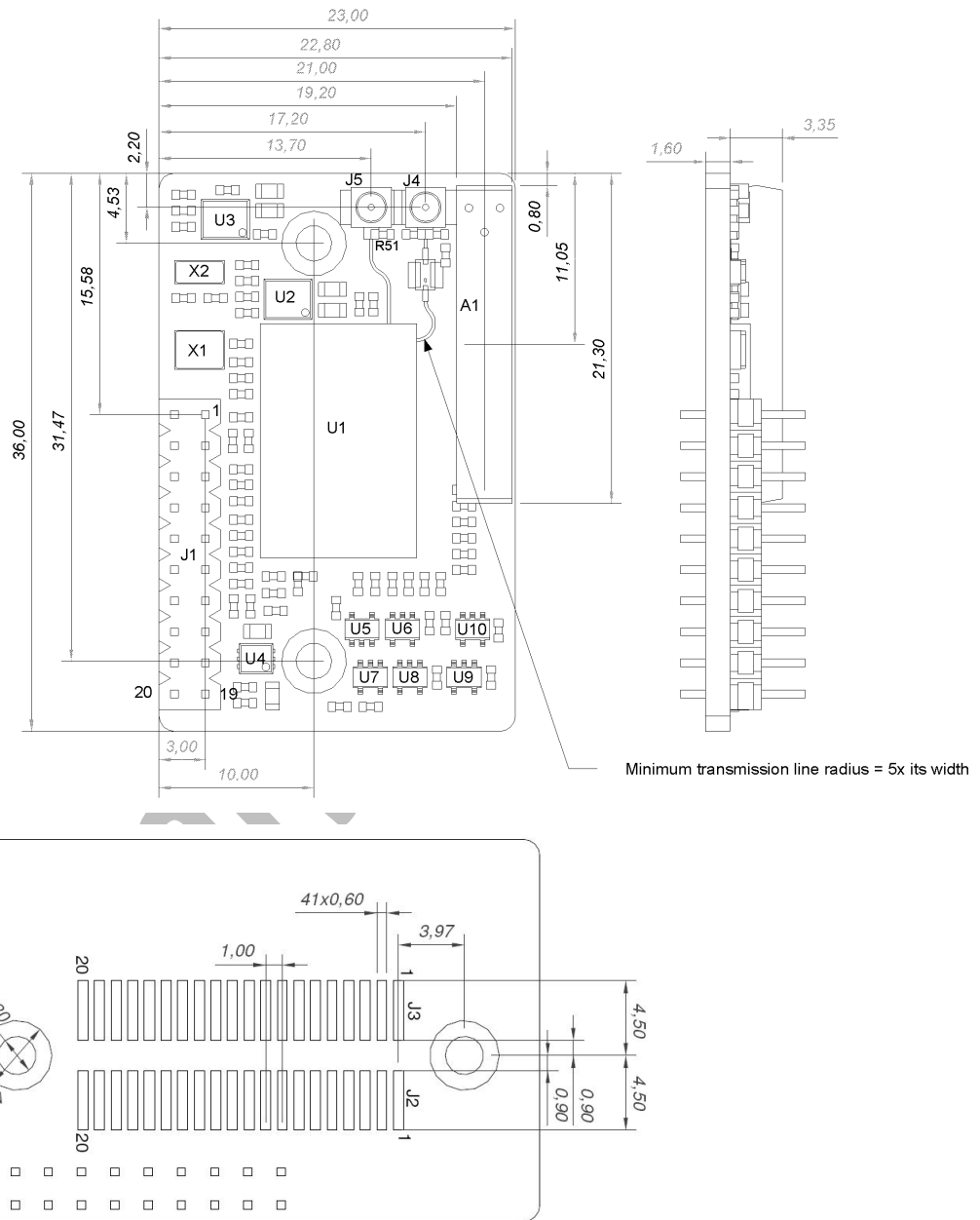


Figure 5: cB-0904 dimensions [mm].

4.2 Using the J2/J3 Board-to-Board Connectors

The board-to-board connector should be a 1mm pitch one-piece part connector. The recommended manufacture is Samtec with many connector options available; see section 4.2.1.1.

Chapter 2 contains more information about the connector and the electrical interface.

4.2.1 Suitable One-Piece Part Connectors

4.2.1.1 Double row ASP-118580-01 / ASP-118581-01 Connectors

This connector is a double row connector and connects both J2 and J3.

This connector has a height of 3.0mm and this has to be considered if components are to be mounted on the motherboard under the CB-OWLAN211b board. The connector is also available with a height of 6.0mm and 10.0mm (The FSI-120 series from Samtec).

There are alignment pins on the bottom side of the connector.

The connector is available with M2 threaded inserts (ASP-118580-01) that fit the mounting holes on the board. You may screw the CB-OWLAN211b board directly into these inserts. If you want to have a tighter and more secure mounting you may use longer screws and secure it using a nut on the backside of the motherboard.

Another way to mount the module is to use press-fit nuts on the motherboard and skip the M2 threads on the connector (ASP-118581-01), see section 4.3 for more information about press-fit nuts.

Table 11: Double row connectors from Samtec.

Samtec order number	Quote number	Equivalent part	Package	Remark
REF-120021-01	55392	FSI-120-03-G-D-AB	Tube	Align pin on bottom side only
REF-120021-02	55392	FSI-120-03-G-D-AB-K-TR	Tape-n-Reel	Align pin on bottom side only
REF-120018-01	55392	FSI-120-03-G-D-M-AB	Tube	With M2 threaded inserts and align pin on bottom side only
REF-120018-02	55392	FSI-120-03-G-D-M-AB-K-TR	Tape-n-Reel	With M2 threaded inserts and align pin on bottom side only

NOTE:

When ordering connectors from Samtec or an official Samtec distributor, please use the REF order number and refer to the connectBlue global quote number for best price. For technical questions regarding the Samtec connectors please contact connectBlue or Samtec at (Scandinavia@samtec.com).

See Figure 6 for more information about the connector and necessary measurements on the motherboard. The large mounting holes on the motherboard are designed for press-fit nuts and could be smaller if press-fit nuts are not used.

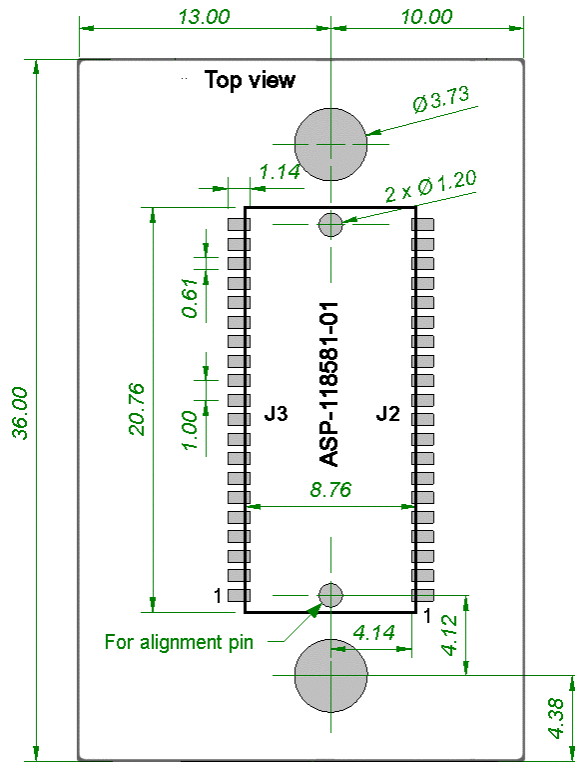


Figure 6: Host PCB layout [mm] for double row connector.

4.3 Using Press-Fit Nuts for Mounting the Module

A press-fit nut is pressed into the PCB from the bottom side with a special press tool. M2 sized press-fit nuts are suitable for the modules (see Figure 6) and are manufactured by PEM Fastening Systems (www.pemnet.com), part no KFS2-M2 (see Figure 7). Be careful with the distance between the nuts regarding alignment.

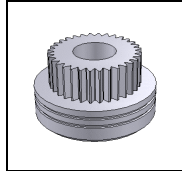


Figure 7: KFS2-M2 press-fit nut.

Spacer-pipes are recommended to use between the PCBs when press-fit nuts are used.

4.4 Antenna Issues

The unit cannot be mounted arbitrary, because of the radio communication. The unit with an internal surface mounted antenna (CB-OWLAN211bi) cannot be mounted in a metal enclosure.

No metal casing or plastics using metal flakes should be used, avoid also metallic based paint or lacquer. Keep a minimum clearance of 10mm between the antenna and the casing. Keep 10 mm free space from metal around the antenna.

If a metal enclosure is required, one of the external antenna options has to be used. See section 3.2 for more information on the antenna options available.

5 WLAN Information

In the tables below you can find information about WLAN properties.

Table 12: WLAN information CB-OWLAN211b i/x

Parameter	Data
Radio	Phillips BGW200 (16dBm)
RF output power	max 16dBm
Receive sensitive level	-85dBm
Receive input level (max)	-20dBm
Output frequency	2.402 –2.480 GHz, ISM band.
WiFi Certified	

6 Regulatory Information

6.1 Declaration of Conformity TBD



We, **connectBlue AB**, of
Norra Vallgatan 64 3V
SE-211 22 Malmö, Sweden

declare under our sole responsibility that our products:

cB-OWLAN211bi (cB-0095, cB-0096),
cB-OWLAN211bx (cB-0097, cB-0098)

to which this declaration relates, conforms to the following product specifications:

R&TTE Directive 1999/5/EC

EN 300 328 V1.6.1 (2004-11)

EMC Directive: 89/336/EEC

EN 301 489-1 V1.4.1 (2002-08)

EN 301 489-17 V1.2.1 (2002-08)

EN 61000-6-2 (2001)

Safety Compliance

EN 60950-1:2001 and/or IEC 60950-1:2001 (1st Edition)

EN 60950-1/A11:2004 + Corrigendum:2004

24/09/2005 Malmö, Sweden

Mats Andersson

CTO of connectBlue AB

If a cB-OWLAN211b i/x is used within EU a notification may be necessary to be made to each of the national authorities responsible for radio spectrum management of the intention to place radio equipment that uses frequency bands whose use is not harmonized throughout the EU, on its national market.

More information at: <http://europa.eu.int/comm/enterprise/rtte/gener.htm>

6.2 Safety Compliance

In order to fulfill the safety standard EN 60950-1 the unit must be supplied by a limited power source.

6.3 FCC and IC Compliance

See Table 1 for information about the different product variants.

6.3.1 Compliance for cB-0904-02

6.3.1.1 FCC Statement for cB-0904-04

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

Consult the dealer or an experienced radio/TV technician for help

6.3.1.1.1 Antenna

Our module type cB-0904-02 is for OEM integrations only. The end-user product will be professionally installed in such a manner that only the authorized antennas are used.

6.3.1.1.2 Caution

Any changes or modifications NOT explicitly APPROVED by connectBlue AB could cause the module to cease to comply with FCC rules part 15, and thus void the user's authority to operate the equipment.

6.3.1.2 IC Compliance

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received,

including interference that may cause undesired operation.

This device has been designed to operate with an antenna having a maximum gain of 9dBi.

Having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb.

6.3.1.3 Labeling Requirements for End Product

For an end product using the product cB-0904-02 there must be a label containing, at least, the following information:

This device contains FCC ID: PVH090402 IC: 5325A-090402

The label must be affixed on an exterior surface of the end product such that it will be visible upon inspection in compliance with the modular approval guidelines developed by the FCC.

Where the module will be installed in final products larger than 8 cm x 10 cm following statement has to be placed ONTO the device.

"This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation."

In case, where the final product will be installed in locations where the end-consumer is not able to see the FCC ID and/or this statement, the FCC ID and the statement shall also be included in the end-product manual.

6.3.1.4 RF-exposure Statement for cB-0904-02

This modular transmitter MUST have a separation distance of at least 2.5 cm between the antenna and the body of the user or nearby persons, excluding hands, wrists, feet, and ankles.

If the radio module is installed in a laptop display, transmission MUST be prevented if the lid is closed to ensure that the minimum distance of 2.5 cm between the user and the transmitting antenna is maintained.

Any notification to the end user of installation or removal instructions about the integrated radio module is NOT allowed.

6.4 UL listing information

If a customer intends to UL list a product including any of the Bluetooth modules based on the PCB cB-0904-02 this information is useful:

The printed circuit board if produced according to the following specification:

- UL recognized ZPMV2 min. 105 °C flame class V-0 or better.

6.5 Compliance with RoHS directive



All products based on the PCB cB-0904-02 are produced according to the RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment) directive and complies with the directive.

7 Guidelines for Efficient and Safe Use

7.1 General

Read this information before using your OWLAN211b module.

For any exceptions, due to national requirements or limitations, when using your OWLAN211b module, please contact connectBlue AB.

Note: Changes or modifications to the product not expressly approved by connectBlue AB will void the user's authority to operate the equipment.

7.2 Product Care

- Do not expose your product to liquid or moisture.
- Do not expose you product to extreme hot or cold temperature (see Section 2.3.3 for further information)
- Do not expose your product to lit candles, cigarettes, cigars, open flames, etc.
- Do not drop, throw or try to bend your product since rough treatment could damage your product.
- Do not attempt to disassemble your product. Doing so will void warranty. The product does not contain consumer serviceable or replaceable components. Service should only be performed by connectBlue AB.
- Do not paint your product as the paint could prevent normal use.
- If you will not be using your product for a while, store it in a place that is dry, free from damp, dust and extreme heat and cold.

7.3 Radio Frequency Exposure

The OWLAN211b module contains a small radio transmitter and receiver. During communication with other WLAN products the OWLAN211b Module receives and transmits radio frequency (RF) electromagnetic fields (microwaves) in the frequency range 2400 to 2500 MHz. The output power of the radio transmitter is very low.

When using the OWLAN211b module, you will be exposed to some of the transmitted RF energy. This exposure is well below the prescribed limits in all national and international RF safety standards and regulations.

7.4 Electronic Equipment

Most modern electronic equipment, for example, in hospitals and cars, is shielded from RF energy. However, certain electronic equipment is not. Therefore:

Note: This equipment emits RF energy in the ISM (Industrial, Scientific, Medical) band. Please insure that all medical devices used in proximity to this device meet appropriate susceptibility specifications for this type of RF energy.

7.5 Potentially Explosive Atmospheres

Turn off your electronic device before entering an area with potentially explosive atmosphere. It is rare, but your electronic device could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling areas, such as petrol station, below deck on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

7.6 Power Supply

The OWLAN211b module must be supplied by a limited power source according to EN 60950-1.

- Connect your power supply only to designated power-sources as marked on the product.
- Make sure all cords and cable are positioned so that they will not be stepped on, tripped over or otherwise subject to damage or stress.
- To reduce risk of electric shock, unplug the unit from any power source before attempting to clean it.

Appendix A - Application Notes

Usually only a subset of the available functionality is of interest to the designer. In addition, depending on the host system, the electrical interface can be designed in many ways. The designer can use the step-by-step guide in this chapter as an aid in the design process.

A.1 Step-by-Step Guide

Table 13: Step-by-step guide with Yes and No answers.

Question	Yes	No
Are you going to integrate the CB-OWLAN211b module in a metal enclosure?	The internal antenna models cannot be used. Use the OWLAN 211bx.	You are free to choose between the products. The internal antenna models are lower cost and are easier to design-in. However, an external antenna could give better range.
Do you wish to use SPI when communicating with the CB-OWLAN211b Module?	TBD	TBD
	TBD	TBD
Are you using a 5V host system?	The SPI interface is 5V tolerant	TBD
Is low power consumption important?	The CB-OWLAN211b Module can be held in RESET mode to enable maximum power saving.	
Do you want to manually reset the module?		

A.2 Design Examples

A.2.1 Basic Design

Basic desing example.

Note: The 10uF decoupling capacitor must be positioned close to the module power supply pins. This to compensate for the current peaks during power up and reset release.

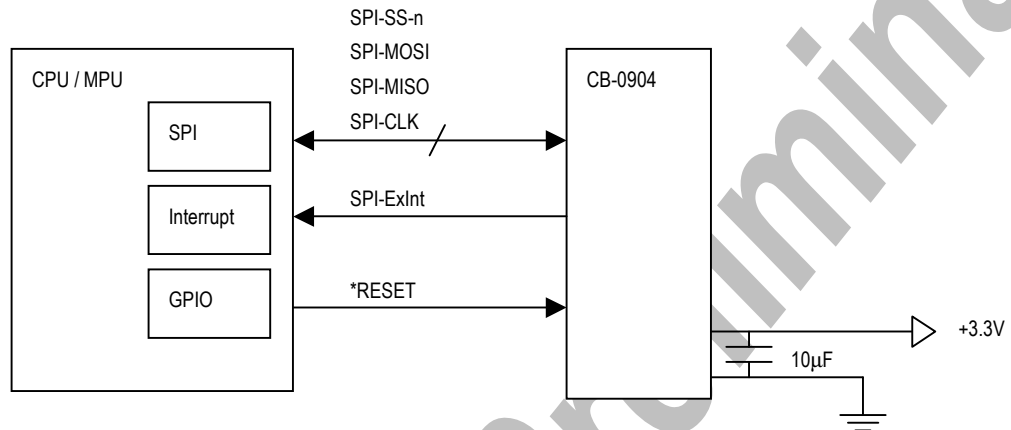


Figure 8: Basic design example.

A.2.2 Reset

The RESET pin can be connected to an external reset source, see Figure 9 for a switch example.

If the reset signal is connected to an output signal it must be an open drain or collector, see Figure 10.

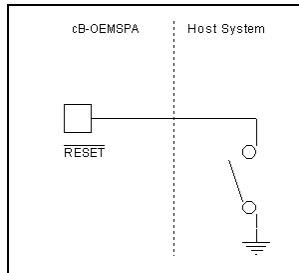


Figure 9: A reset switch.

The RESET pin can be left unconnected if not used.

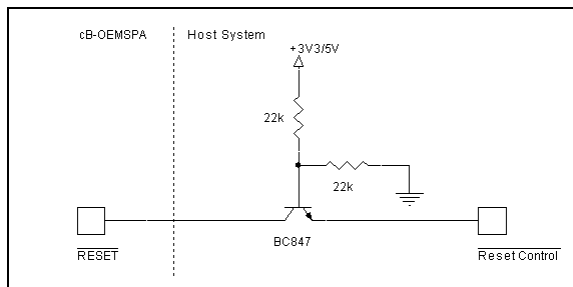


Figure 10: Design of an open collector reset from an active high output.

A.2.3 Bluetooth co-existence

TBD

A.3 Test Points

The firmware outputs diagnostic messages during runtime to aid driver development and for easier troubleshooting. The messages are output as serial data, TTL-level, at test point 4. See Figure 11 for localization of test points.

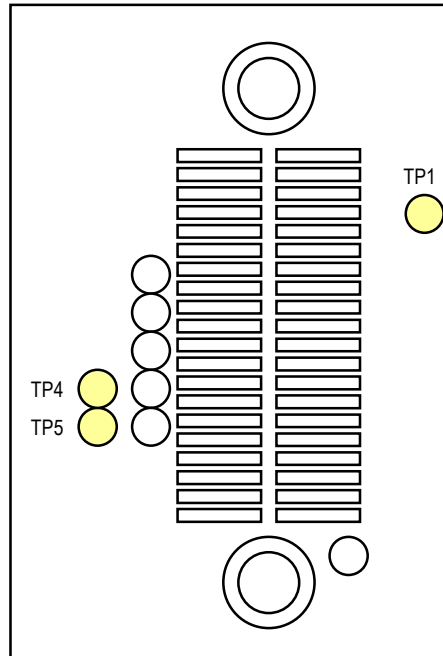


Figure 11: Bottom View showing the location of test points.

A RS232 level shifter needs to be used if the diagnostic messages shall be logged using a PC.

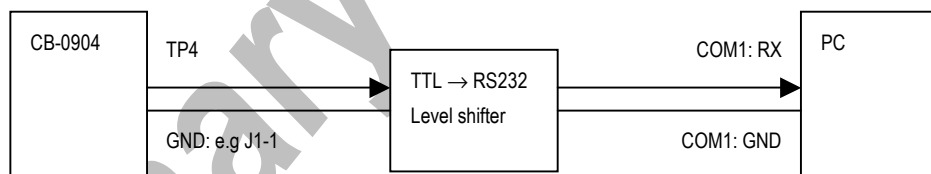


Table 14: Test Points

Symbol	Parameter	Signal Level	Type	Description
TP1	REFCLK_OUT	CMOS	O	Clock reference output. Basic variance: 44.000000MHz \pm 10ppm
TP4	TX	CMOS	O	Diagnostic Messages @ 38400 baud, 8-data bits, even parity, 1 stop-bit
TP5	RX	CMOS	I	Do not connect.

A.3.1 Examples

The following are examples of diagnostic output from the device.

NOTE: The output format is not fixed and can therefore change without notice between different versions of the firmware. The examples listed below are shown for an education purpose only.

A.3.1.1 After Firmware Download

After firmware download is completed the following output is given:

```
Copyright 2005 Philips Semiconductors Inc.  
WLAN SOFTWARE BUILD VERSION 6.35.11.17.05  
Nov 17 2005, 13:07:39  
BUILD FOR RELEASE, 0th time run...  
Me B1  
0:12:F3:FF:FF:FD  
LA 1
```

The most important information, besides the fact that the firmware is actually loaded and running, are the version number and the MAC address. The example above lists firmware version 6.35 and a MAC address of 00:12:F3:FF:FF:FD

A.3.1.2 Scan

```
>Sc  
<sc
```

Scan commands are, similar to other commands, prefixed with a '>' to indicate start of command, and a '<' to indicate end of command.

A.3.1.3 WEP Keys

```
Pairwise WEP key installed
```

The message above shows a successful installation of a WEP key.

A.3.1.4 Association

```
Me B1
***cb-test3
>MESC
>Sc
<sc
<MeSc
J-Cfm
As-Req
As-Res
CW value15
TXOP: 0
CW value15
TXOP: 0
CW value7
TXOP: 94
CW value3
TXOP: 47
A
```

The example above shows a successful association with an access point named "cb-test3". The following sequence can be read:

1. A scan is issued to find the access point. (Sc)
2. A join confirm is received. (J-Cfm)
3. An association request is made. (As-Req)
4. An association response is received. (As-Res)
5. Association complete and successful. (A)