

Blueprint B203

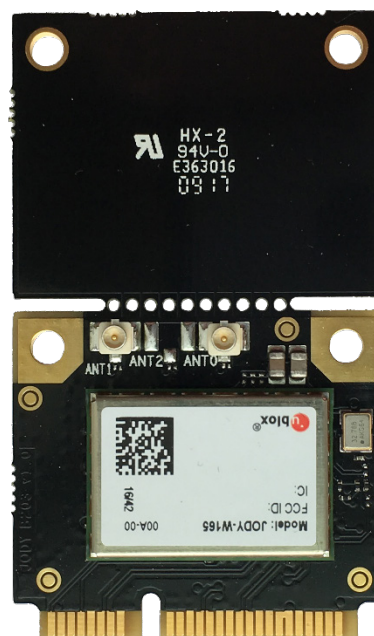
Mini PCI Express card for JODY-W1

Application Note

Abstract

This document describes the features and the performance of the B203 blueprint, which integrates the JODY-W1 Wi-Fi and Bluetooth module on a mini PCI express form factor card.

This design is made available to u-blox customers as a blueprint, including schematic, bill of material, layout and Gerber data.



Document Information

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Disclosure restriction			

This document applies to the following products:

Product name	Type number	u-blox connectivity software version	PCN reference
B203-JODY-W1	B203-JODY-W1-0	N/A	N/A

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1 Introduction

The Blueprint B203 is a ready to use reference design that includes a JODY-W1 series module. The blueprint B203 board:

- Provides a reference for integration of the u-blox JODY-W1 series modules
- Gives an example of choice, placement, and layout of the components
- Provides an example design of one possible antenna path suitable for the JODY-W1 series modules

The blueprint has been created to match the size of the Mini PCIe card form factor and can be reduced to half of the Mini PCIe size. This application note provides information about the hardware solutions implemented in the board and shows the results of testing performed on the unit.

1.1 Photo

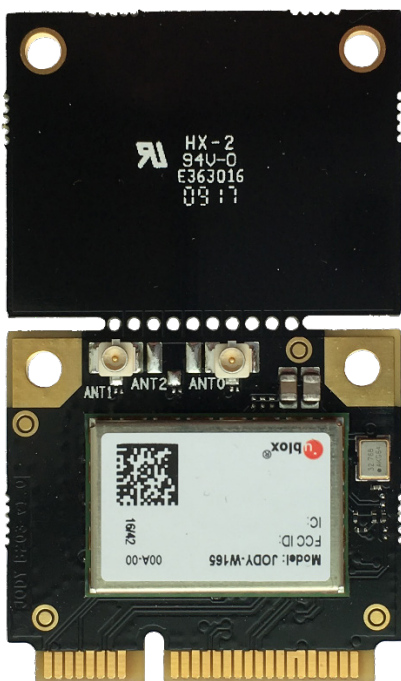


Figure 1: Top side image of Blueprint B203

2 Description

The design deliverables of Blueprint B203 can be requested from u-blox support for your area, as listed in the Contact section.

2.1 Block diagram

Figure 2 shows the block diagram of Blueprint B203. The blueprint uses the PCIe host interface and connects via an FTDI USB-to-UART IC to the Bluetooth interface and the enable (BT_EN) and host wake-up (BT_HOST_WAKE) signals of the JODY-W1 module.

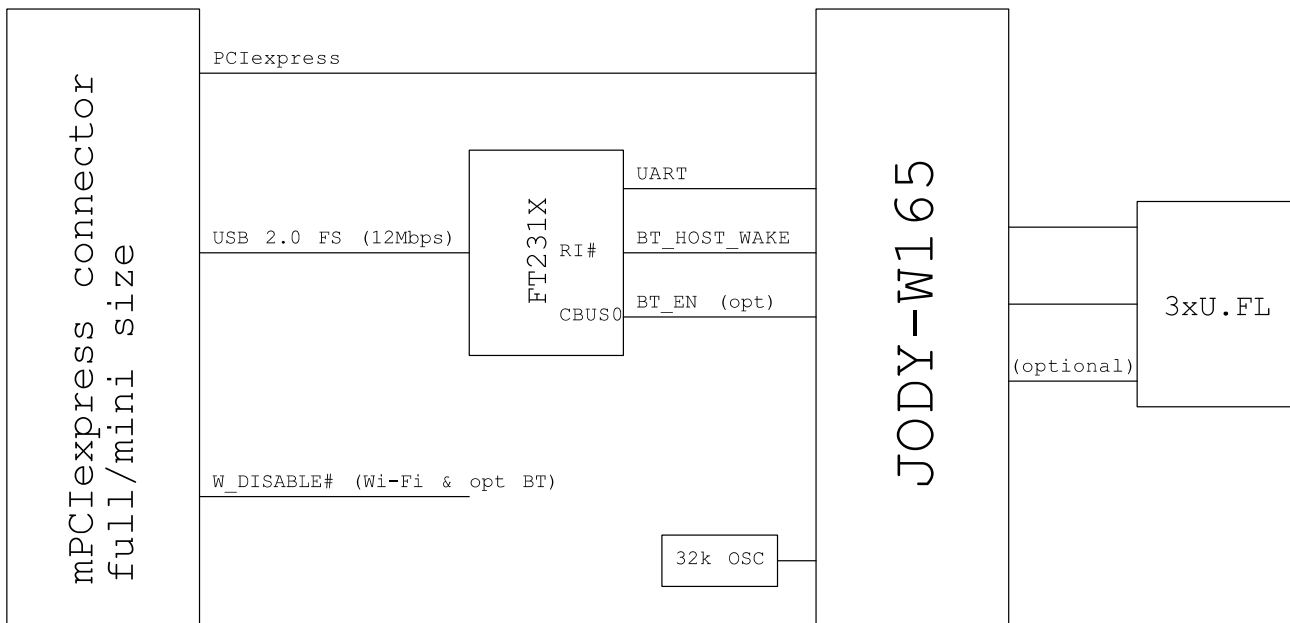


Figure 2: Block diagram of Blueprint B203¹

¹ The JODY-W1 module variant might change.

2.2 Schematics

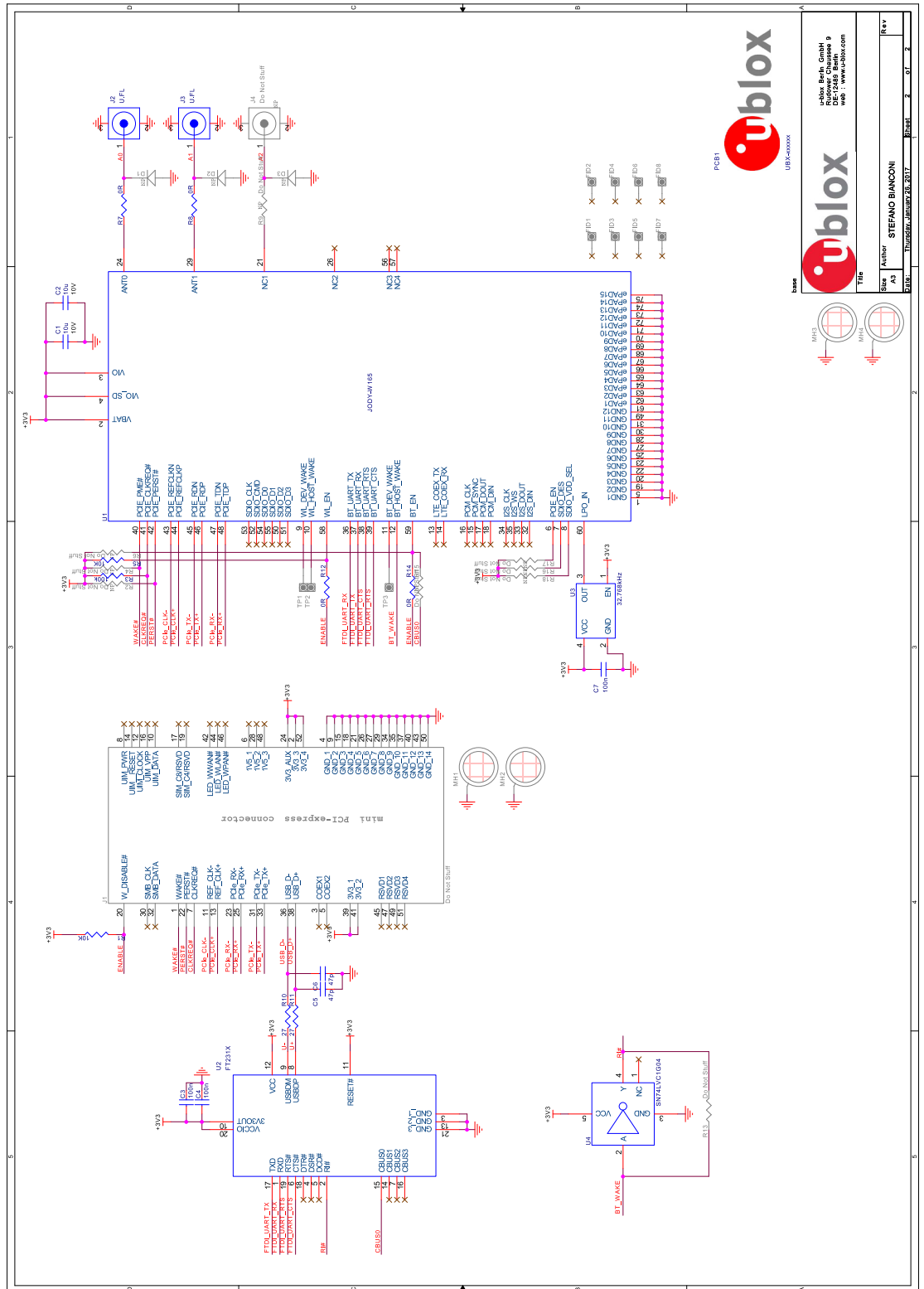


Figure 3 Schematics of Blueprint B203

2.3 Component placement and BOM

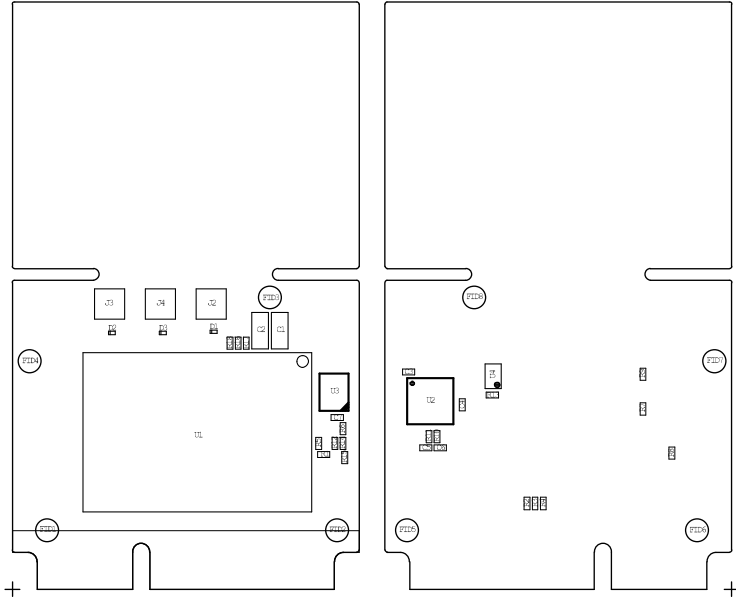


Figure 4: Component placement as shown in the top (left) and bottom (right) view

Part no.	Part ref.	Quantity	Value	Description	Manufacturer	Manufacturer part no.	Distributor (Dist.)	Dist. part number
TMP-165	C1 C2	2	10 u	MLCC0805 10 uF 10 V X7R 10%	Murata	GRM21BR71A106KE51L	Digi-Key	490-3905-6-ND
TMP-112	C3 C4 C7	3	100 n	MLCC0201 100 nF 10 V X5R 10%	TDK	C0603X5R1A104K030BC	Digi-Key	445-7318-1-ND
TMP-173	C5 C6	2	47 p	MLCC0201 47 pF 50 V C0G 5%	TDK	CGA1A2C0G1H470J030BA	Digi-Key	445-9071-1-ND
TMP-170	J2 J3	2	U.FL	Ultra Small SM Coaxial Connector	Hirose	U.FL-R-SMT-1(10)	Digi-Key	H11891CT-ND
TMP-177	PCB1	1	UBX-xxxxxx	JODY-W1, Blueprint B203	u-blox	UBX-xxxxxx		
TMP-141	R1 R5	2	10 K	Thick-Film 10K 0201 1%	Rohm	MCR006YRTF1002	Digi-Key	RHM10KCBCT-ND
TMP-135	R3	1	100 k	Thick-Film 100k 0201 1%	Rohm	MCR006YRTF1003	Digi-Key	RHM100KCBCT-ND
TMP-144	R7 R8 R12 R14	4	OR	Thick-Film OR 0201	Rohm	MCR006YRTJ000	Digi-Key	RHM0.0CCCT-ND
TMP-174	R10 R11	2	27	Thick-Film 27ohm 0201 1%	Rohm	MCR006YRTF27R0	Digi-Key	RHM27CBCT-ND
TMP-169	U1	1	JODY-W164	Host-based module with Wi-Fi and dual-mode Bluetooth	u-blox	JODY-W164-03A		
TMP-172	U2	1	FT231X	USB to Full UART IC	FTDI	FT231XQ-R	Digi-Key	768-1128-1-ND
TMP-171	U3	1	32.768 kHz	32.768 kHz Oscillator, 25 ppm, 3.3 V	Abrakon	ASEK-32.768KHZ-LRT	Digi-Key	535-9998-1-ND
TMP-175	U4	1	SN74LVC1G04	Single Inverter Gate	TI	SN74LVC1G04DCKR	Digi-Key	296-11600-1-ND

Table 1: Materials (BoM) used with Blueprint B203

2.4 Mechanical dimensions and PCB details

The form factor of Blueprint B203 conforms to a mini PCI express card with a dimension of 50 mm x 30 mm.

The PCB has a 4-layer stack-up with only through hole vias and the thickness is 1.0 mm.

The JODY-W1 module is placed on the top side of the blueprint.

Build Up	Description	Material	[μm]	Remarks
	Pastemask on top layer			
	Silkscreen on top layer			Color: white
	Soldermask on top layer		12	+/- 10 μm , all via holes must be covered with soldermask, color: Black
	Top CU surface coating	chemical Ni/Au	35	+/-15 μm , Finished thickness, Gold plating on mPCIe connector area
	Top layer	CU		
	Dielectric		155	+/-10 μm DK@2GHz: 4
	Plating		35	+/-15 μm , Finished thickness
	Layer 2	CU		
	Dielectric		550	+/-20 μm DK@2GHz: 4
	Layer 3	CU		
	Plating		35	+/-15 μm , Finished thickness
	Dielectric		155	+/-10 μm DK@2GHz: 4
	Bottom layer	CU		
	Bottom CU surface coating	chemical Ni/Au	35	+/-15 μm , Finished thickness, Gold plating on mPCIe connector area
	Soldermask on bottom layer		12	+/- 10 μm , all via holes must be covered with soldermask, color: Black
	Silkscreen on bottom layer			Color: white
	Pastemask on bottom layer			None
Total Thickness:			1024	+/-100 μm Minimize coplanarity error (Warp & Wrist <0.75%)

Table 2: PCB stack up of Blueprint B203

2.5 Power supply

In Blueprint B203, the mPCIe connector (3.3 V) provides power to all (VBAT, VIO and VIO_SD) PINs of the JODY-W1 module.

2.6 PCIe Host interface

The JODY-W1 module is connected with one differential transmit pair, one differential receive pair, and the PCI Express differential reference clock (100 MHz) of the mPCIe connector. The bootstrap configuration of the module is set to PCIe mode.

2.7 UART interface

To access the Bluetooth feature of the JODY-W1 series module, the UART signals are connected via an FTDI IC to the provided USB bus of the mPCIe connector.

2.8 Antenna interface

Blueprint B203 routes the antenna traces through the bottom PCB layer to comply with the space restriction of the half PCI Express miniCard form factor. The antenna signals are provided via two u.FL connectors. The Blueprint B203 is equipped with the footprint and the antenna traces for the three antenna variants of the JODY-W1 series modules (including JODY-W167), but the connector for the third antenna is not assembled yet.



The antenna trace design on the Blueprint B203 is not certified yet. If you would like to use this antenna design, contact u-blox support to discuss the certification.

3 Performance

3.1 Throughput

Throughput information will be added later.

3.2 Antenna measurements

Antenna measurements will be added later.

4 Delivered package

The Blueprint B203 delivery package includes the following:

- Schematic files
- BOM files
- Gerber files
- Pick and Place file
- Assembly files
- Board Stack-up

A Appendix

List of acronyms

Abbreviation / Term	Explanation / Definition
BOM	Bill Of Materials
GPIO	General Purpose Input Output
HW	Hardware
LED	Light Emitting Diode
LDO	Low Drop-Out
LPO	Low Power Oscillator
RF	Radiofrequency
SDIO	Secure Digital Input Output
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus
Wi-Fi	IEEE 802.11 short range radio technology

Related documents

- [1] JODY-W1 Data sheet, document number UBX-16013635
- [2] JODY-W1 Series System Integration Manual, document number UBX-16012621
- [3] EVK-JODY-W1 User Guide, document number UBX-16025670



For regular updates to u-blox documentation and to receive product change notifications, register on our homepage (www.u-blox.com).

Revision history

Revision	Date	Name	Comments
R01	11-Oct-2017	shoe, mzes, ajah	Initial release.
R02	11-Apr-2018	mzes, kgom	Replaced references to "JODY-W165 variant" with "JODY-W1 module" (as the variants can differ). Update BOM (Table 2).

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