u-blox C101-D9C Application Board User Guide

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C101-D9C

Application board (rev. C)

User guide

Abstract
This document explains the use of C101-D9C application board. The C101-D9C board enables customers to evaluate QZSS L6 correction services with the NEO-D9C correction data receiver.

Document information

Title	**C101-D9C**	
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This document applies to the following products:

Product name	Type number	Firmware version	PCN reference
C101-D9C	C101-D9C-0-00	FW QZS 1.01	N/A

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1 Introduction

The C101-D9C board is a convenient tool that allows customers to become familiar with the u-blox NEO-D9C QZSS L6 receiver. The board provides facilities for evaluating the product and demonstrating its key features. NEO-D9C is a QZSS L6 receiver that brings QZSS Centimeter Level Augmentation Service (CLAS) support to u-blox GNSS modules, enabling centimeter-level navigation. The receiver can also track the experimental MADOCA service transmitted on the QZSS L6 signal. The C101-D9C application board offers:

- NEO-D9C module for use as QZSS L6 correction data receiver
- USB connection for communication and power supply
- L6 antenna connection for receiving the satellite data stream

- Arduino shield connection

1.1 Package contents

The delivered package contains:

- C101-D9C board
- Multiband antenna (L1/L2/E5b/L6)
- Antenna ground plane (12 cm circular)
- USB interconnect cable
- Jumper connectors

Prior to using the board, it is useful to download the appropriate evaluation software and keep handy the documents listed in the Related documents section.

2 C101-D9C product overview

2.1 Components

C101-D9C houses the NEO-D9C QZSS L6 receiver. The board is powered from the USB cable connection or via Arduino shield. The main components of the board are listed below and shown in Figure 1 and Figure 2:

- Native USB port
- FTDI USB bridge
- SMA RF connector and antenna supply capability (L-band)
- UART2 interface through Arduino shield
- NEO-D9C RESET button
- NEO-D9C SAFEBOOT button

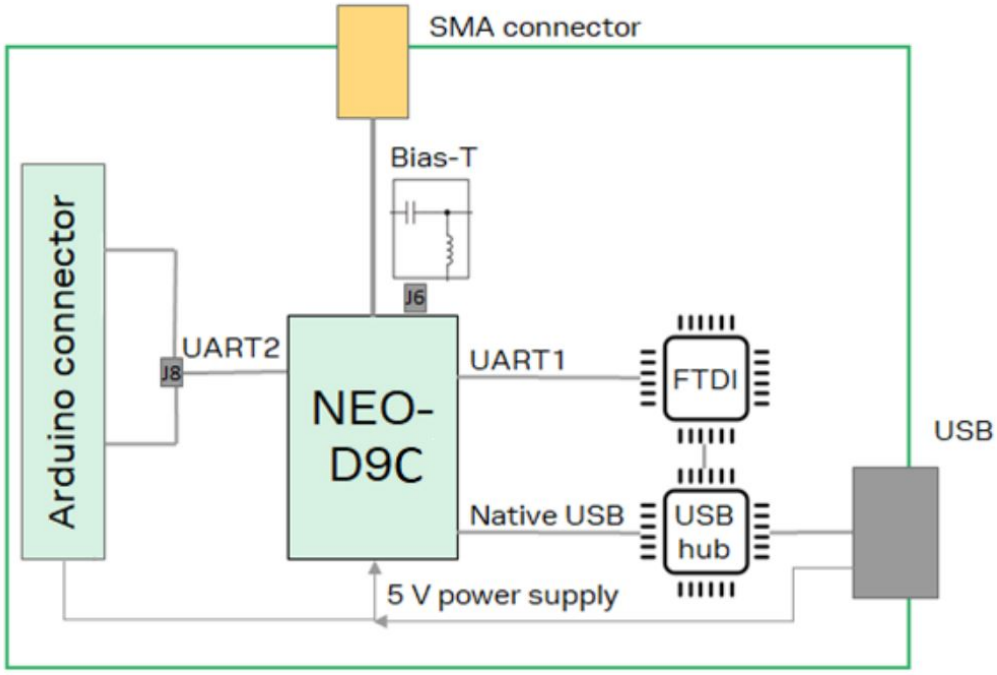


Figure 1: C101-D9C block diagram

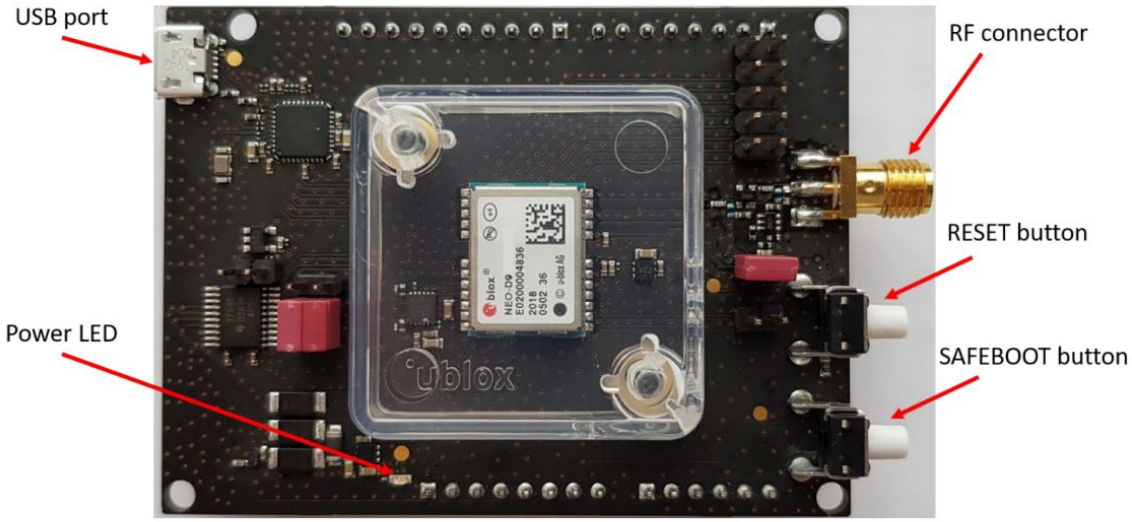


Figure 2: C101-D9C quick start basic overview

2.2 Jumpers

The board is delivered with the following default jumpers:

- J6: This jumper provides 3.3 V power supply to an external active antenna plugged to the SMA RF connector. The current limit circuit is also enabled up to 60 mA.
- J8: This jumper switches the communication from the UART2 of the NEO-D9C to the UART1 or UART2 of the C099-F9P, when connected via the Arduino shield (refer to section 4.1 for further details).

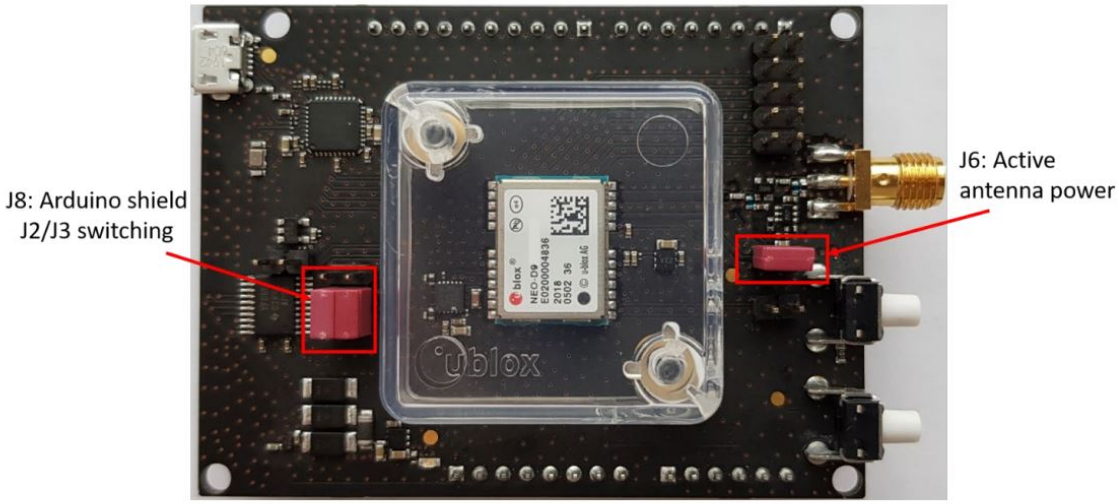


Figure 3: C101-D9C jumpers overview

For further details, see the C101-D9C schematic in Appendix C.

3 C101-D9C standalone operation

This section provides some quicksteps to enable NEO-D9C standalone operation and connecting via u-center (see u-center user guide [3]).

- Connect the supplied L6 band antenna to the RF SMA connector.
- Connect the USB to a Windows PC, this will power the board. The FTDI and USB drivers will be installed automatically from Windows Update when you connect the board for the first time.
- The power LED will turn on in blue color. · Start the Device Manager utility from Windows. Two new ports will be visible under the Ports tab: the USB Serial Device is the Native USB port and the USB Serial Port is the FTDI USB bridge port, as shown in Figure 5.

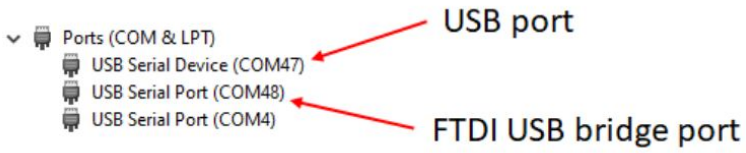


Figure 4: Windows Device Manager Ports identifications

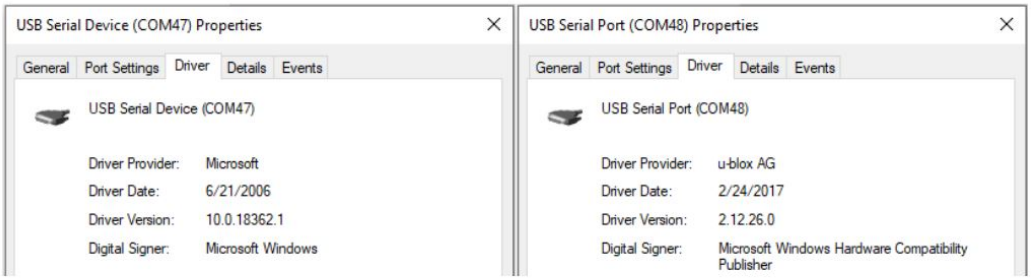


Figure 5: FTDI USB bridge and USB ports properties

- Start u-center and connect to one of the COM ports. If you are using the FTDI USB bridge, make sure the baud rate in u-center is set to 9600.
- Poll UBX-MON-VER message and check the content as shown in Figure 6 .

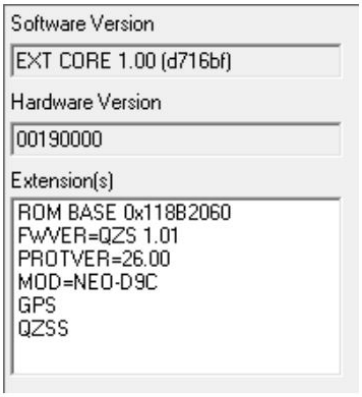


Figure 6: UBX-MON-VER message

- Poll or enable the UBX-RXM-QZSSL6 message to check the received correction data.

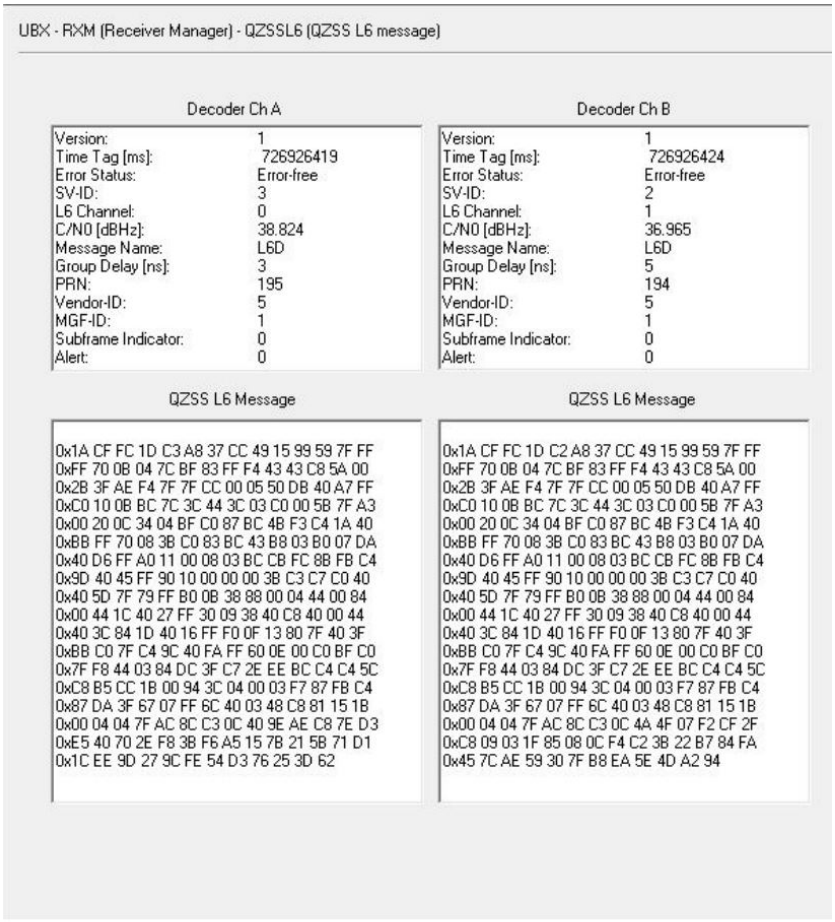


Figure 7: UBX-RXM-QZSSL6 message

For further details regarding the UBX-RXM-QZSSL6 message, see the related Interface description [4].

4 C101-D9C operation with C099-F9P

It is possible to use the C101-D9C board together with C099-F9P. Figure 9 shows how to interface the C101-D9C board with the C099-F9P board. Two types of connections are available:

- USB interface (through PC)
- Arduino shield interface (UART2 direct connection)

When the USB connection is used, the corrections are provided through the host computer. Security checks and data conversion are the responsibility of the user application, as well as the forwarding of the corrections to the ZED-F9P.

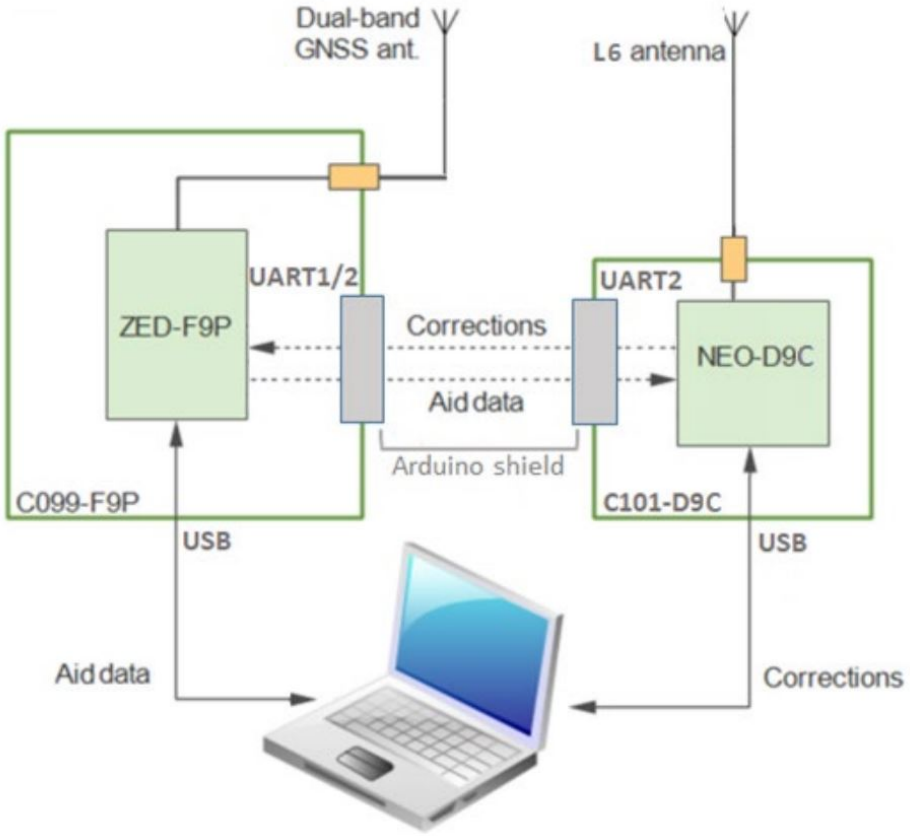


Figure 8: C101-D9C - C099-F9P interfacing scheme

The provided multiband antenna can be used in combination for ZED-F9P and NEO-D9C, RF signal splitter is needed. For further details, see the antenna specification in Appendix B.

4.1 C101-D9C/C099-F9P via Arduino shield

Figure 9 shows the placement of the Arduino connectors on the C101-D9C board and Figure 10 shows how to physically connect the C099-F9P board to the C101-D9C board via the Arduino shield. Jumper J18 on the C099 board is needed for the ZED-F9P to receive the correction data on UART1 port. See the C099 application board User guide [5] for further details.

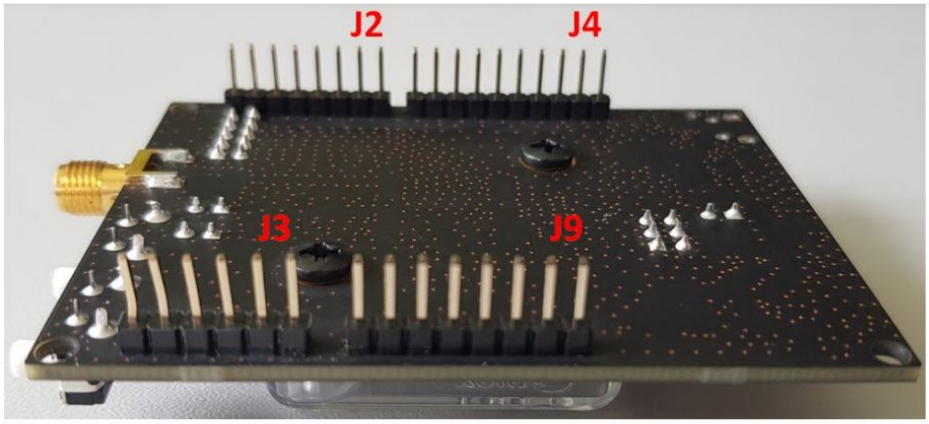


Figure 9: C101-D9C Arduino connectors

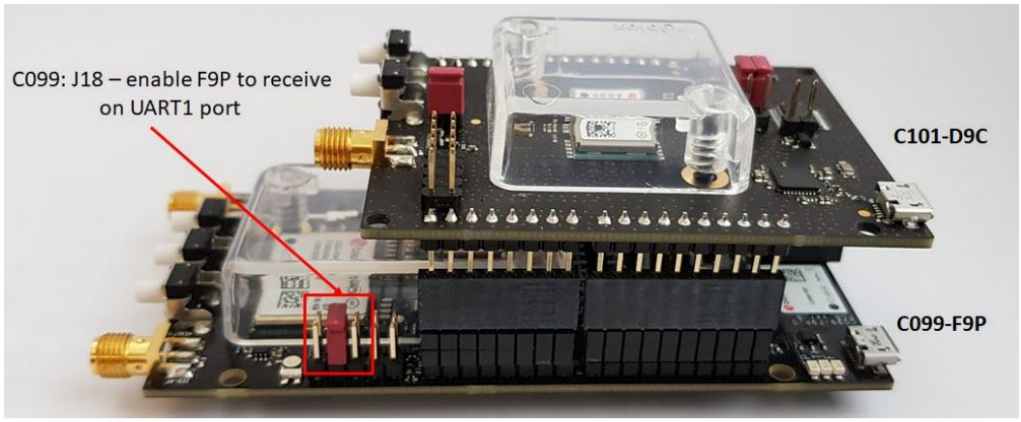


Figure 10: Connecting C101-D9C to C099-F9P

Depending on the position of the jumper J8 on the C101-D9C board (as shown following) the ZED-F9P housed on the C099-F9P board will receive the correction data on the UART1 or UART2:

The ZED-F9P receives the correction data on UART1.

The ZED-F9P receives the correction data on UART2.

For further details, see the C101-D9C schematic in Appendix C. UBX protocol needs to be enabled in output on the UART2 interface of the NEO-D9C to allow the communication, using the following configuration item: CFG-UART2OUTPROT-UBX=1 For further details regarding receiver configuration, see the related Interface description [4].

Appendix

A Glossary

Abbreviation	Definition
FTDI	Future Technology Device International
GEO	Geostationary Earth Orbit
LED	Light Emitting Diode
LNA	Low Noise Amplifier
RF	Radio Frequency
QZSS	Quasi Zenith Satellite System
RHCP	Right Hand Circular Polarized
SMA	Subminiature version A
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus

Table 1: Explanation of the abbreviations and terms used

B Antenna specification (L1/L2/E5b/L6)
The following is an overview of the provided Inpaq L6 antenna, GPSLX09U8W-S6-07-B:

. Patch

Characteristics	Specification	
Frequency Range	L1: 1561~1610 MHz L2/L5/L6 : 1197~1285 MHz	
Peak Gain	1561 MHz	5.2 dBic
	1575.42 MHz	5.7 dBic
	1602 MHz	3.3 dBic
	1610 MHz	2.3 dBic
	1197 MHz	0.7 dBic
	1227.6 MHz	5.4 dBic
	1278.75 MHz	3.4 dBic
	1285 MHz	2.9 dBic
Polarization	RHCP	
Axial Ratio	3.0 dB typ.	
VSWR	2.0 typ.	
Impedance	50 ohm	

. Filter / LNA

Characteristics	Specification		
Frequency Range	L1:1561~1610 MHz L2/L5/L6: 1197~1285 MHz		
Gain	1561 MHz	35.0±3.0 dB	
	1575.42 MHz	37.0±3.0 dB	
	1602 MHz	35.0±3.0 dB	
	1610 MHz	34.0±3.0 dB	
	1197 MHz	34.0±3.0 dB	
	1227.6 MHz	34.0±3.0 dB	
	1278.75 MHz	34.0±3.0 dB	
	1285 MHz	34.0±3.0 dB	
Noise Figure	2.0 dB typ.		
Filter Out Band Attenuation	F_1= 1561 MHz	F_1-50 MHz	> 75 dB
		F_1-100 MHz	> 75 dB
	F_2= 1610 MHz	F_2+50 MHz	> 65 dB
		F_2+100 MHz	> 65 dB
	F_3= 1197 MHz	F_3-50 MHz	> 0.5 dB
		F_3-100 MHz	> 10 dB
	F_4= 1285 MHz	F_4+50 MHz	> 5 dB
		F_4+100 MHz	> 35 dB
Output VSWR	2.0 typ.		
Operation Voltage	3.0~5.0 V		
Current	31.0±3.0 mA		

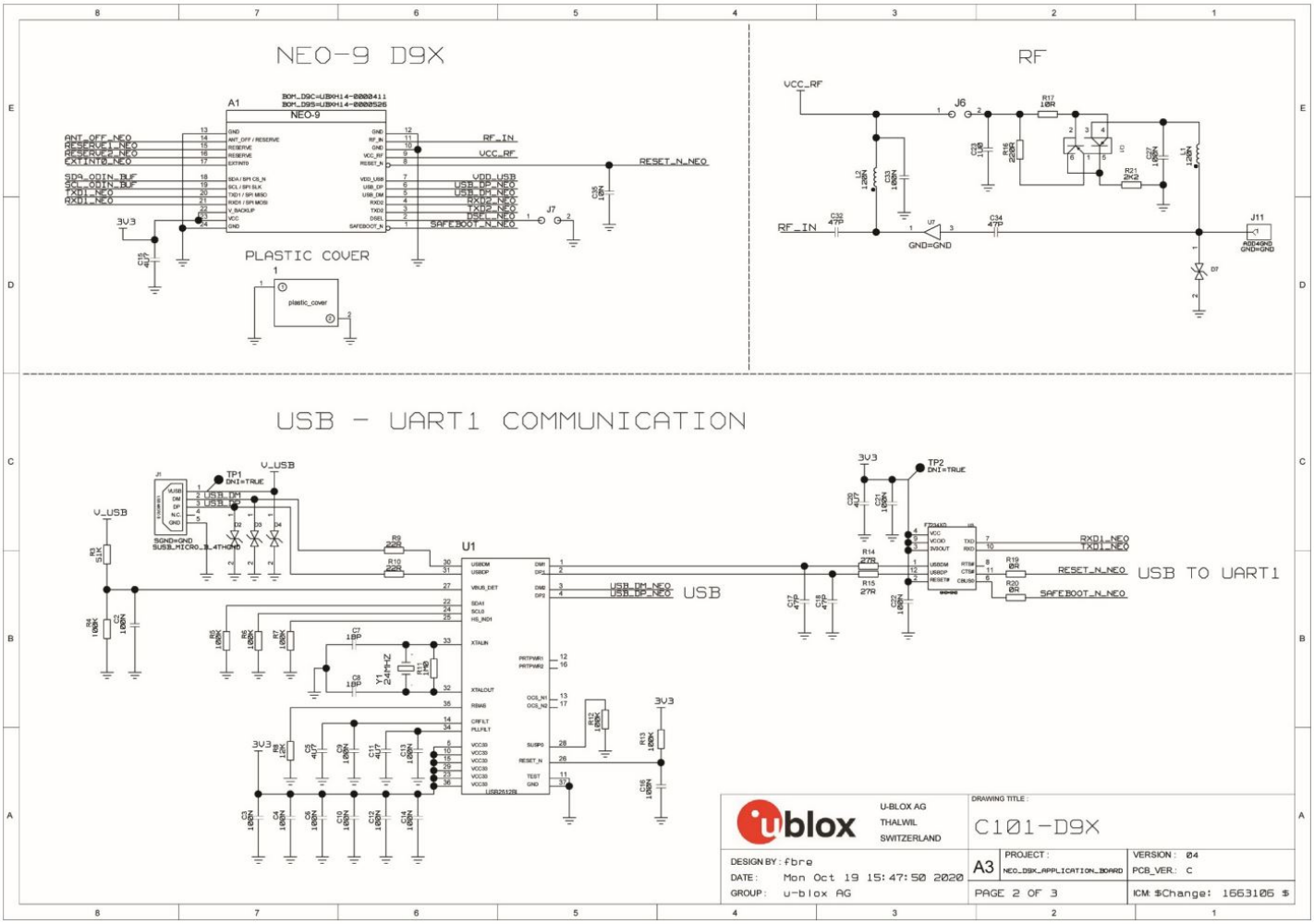
Overall Specification (Through Antenna, LNA, Without Cable Loss)

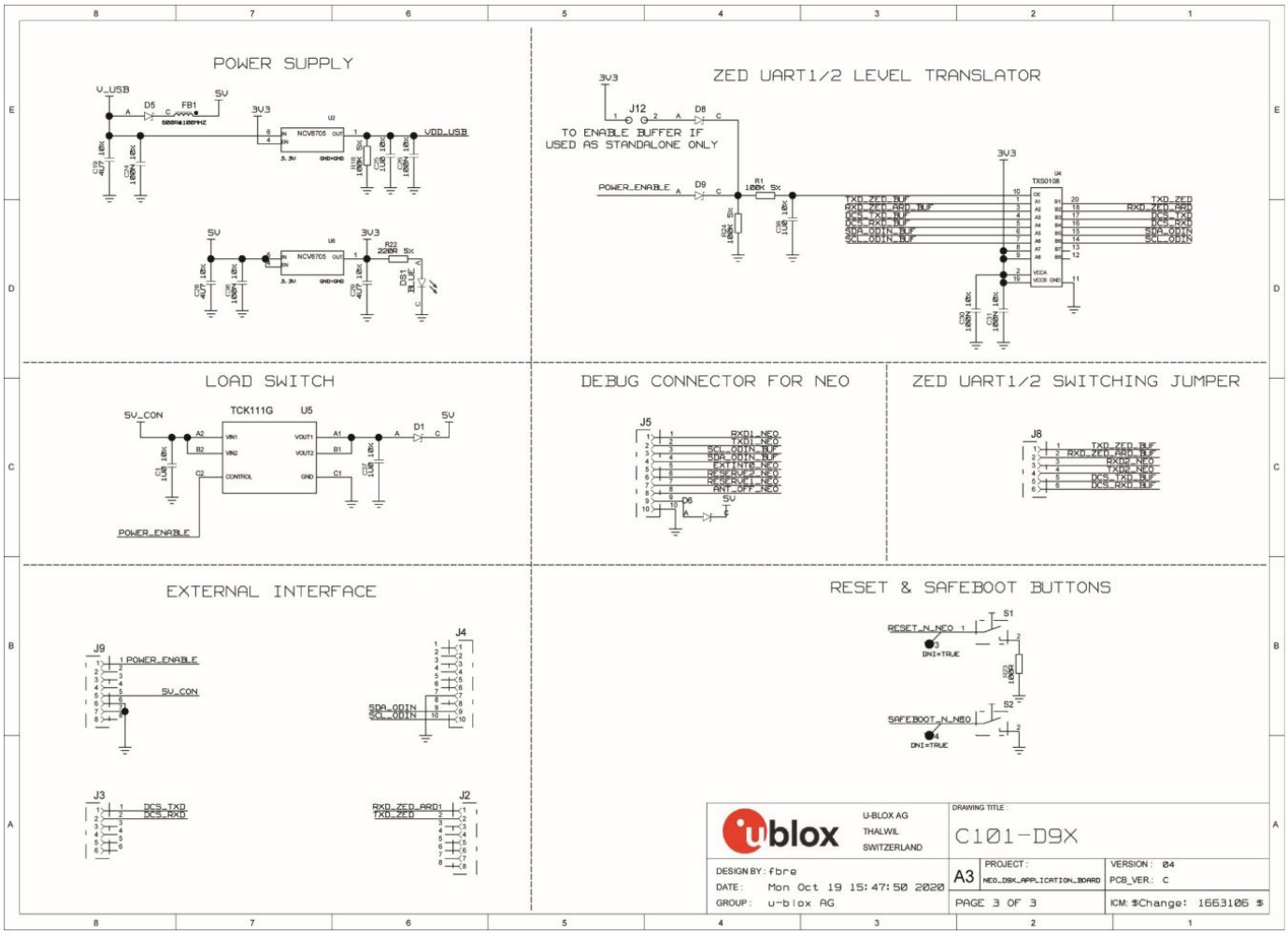
Characteristics	Specification	
Frequency Range	L1:1561~1610 MHz L2/L5/L6: 1197~1285 MHz	
Gain	1561 MHz	40.2±3.0 dB
	1575.42 MHz	42.7±3.0 dB
	1602 MHz	38.3±3.0 dB
	1610 MHz	36.3±3.0 dB
	1197 MHz	34.7±3.0 dB
	1227.6 MHz	39.4±3.0 dB
	1278.75 MHz	37.4±3.0 dB
	1285 MHz	36.9±3.0 dB
Output VSWR	2.0 typ.	
Operation Voltage	3.0~5.0V	
Current	31.0±3.0 mA	

See the NEO-D9C Integration manual [1] for further details.

C C101-D9C schematics

The following pages show the complete schematics for the C101-D9C evaluation board.





Related documentation

1. NEO-D9C Integration manual, UBX- 21031631
2. ZED-F9P Integration manual, UBX-18010802
3. u-center User guide, UBX-13005250
4. u-blox D9 QZS 1.01 Interface description, UBX- 21031777
5. C099 App Board User guide, UBX-18055649

For product change notifications and regular updates of u-blox documentation, register on our website, **www.u-blox.com**.

Revision history

Revision	Date	Name	Comments
R01	20-Apr-2021	dama	Initial release
R02	17-Jan-2022	dama	C1-Public disclosure restriction Firmware name update Chapter 4 general update regarding UART2 Related document section update

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Documents / Resources

u-blox C101-D9C Application Board [pdf] User Guide
C101-D9C Application Board, C101-D9C, Application Board, Board

References

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