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C099-F9P

Application board (rev. E), ODIN-W2 u-connectXpress software

User guide

Abstract

The C099-F9P board enables customers to evaluate RTK operation with the ZED-F9P high precision GNSS receiver. The board provides short-range wireless connection via Bluetooth® or Wi-Fi for receiving correction data and logging via wireless connectivity.

Document information

Title	**C099-F9P**	
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This document applies to the following products:

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C099-F9P	C099-F9P-0-03 C099-F9P-1-03 C099-F9P-2-03	FW 1.00 HPG 1.13 u-connectXpress SW 5.0.1 or later	N/A	Production ready

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1 Introduction

The C099-F9P board is a convenient tool that allows customers to become familiar with the u-blox ZED-F9P high precision GNSS module. The board provides facilities for evaluating the product and demonstrating its key features. The C099-F9P application board offers:

- A ZED-F9P module for use as an RTK rover or reference station
- An ODIN-W2 short-range module to provide untethered operation using Bluetooth and Wi-Fi
- Power supply options comprising a USB connection, Li-Po (lithium polymer) cell with recharging ability, and 6-17 V DC input[1]
- Small, lightweight board (110 x 55 mm) with Arduino R3/Uno shield connections for host expansion

The C099-F9P board allows for two alternative firmware versions to be used with the ODIN-W2 short-range module. These are:

1. C099-F9P Mbed3 application firmware. This is the default ODIN-W2 firmware pre-loaded to C099-F9P boards.
2. ODIN-W2 u-connectXpress software. This is the standard firmware for ODIN-W2 modules. See section 7.2 on how to change to this firmware.

☞ This User guide describes how to use the C099-F9P board with the ODIN-W2 u-connectXpress software.

This User guide describes the following use cases:

1. Base and rover operation via serial connectivity
2. Base and rover operation via Wi-Fi (with ODIN-W2 u-connectXpress software)
3. Rover operation via Bluetooth Classic (with ODIN-W2 u-connectXpress software)

This user guide is split into several sections:

- Section 2: C099-F9P quick start provides information on how to get C099-F9P up and running straight out of the box.
- Section 3: C099-F9P description identifies the board's facilities.
- Section 4: Using the C099-F9P provides a comprehensive guide for in-depth usage.
- Section 5: Rover operation using NTRIP shows different ways of connecting to an NTRIP service.
- Section 6: Reference station and rover pairing shows pairing using two C099-F9P boards as a reference/rover pair.
- Section 7: Firmware update provides instructions for updating the firmware of the ZED-F9P high precision GNSS module as well as the ODIN-W2 short-range module.
- Section 8: Arduino header connections provides mechanical specifications for Arduino R3/Uno.
- The sections in the Appendix provide the u-blox configuration files and give information on C099-F9P antenna schematics, and C099-F9P mechanical board dimensions and schematics.

[1] The C099-F9P kit does not contain a battery or an external power adapter.

1.1 Package contents

The delivered package contains:

- C099-F9P board (rev. E)
- u-blox ANN-MB-00 multi-band GNSS antenna and ground plane
- Wi-Fi/Bluetooth antenna
- USB interconnect cable
- Quick start guide
- USB-to-DC plug adapter cable

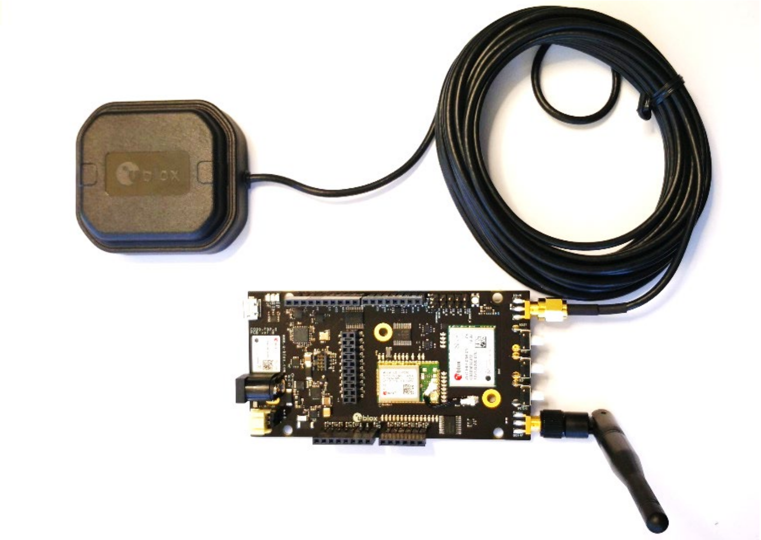


Figure 1: C099-F9P board and antennas

1.2 Additional sources of information

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 C099-F9P quick start

This section provides some quick steps to enable ZED-F9P operation before exploring the more complex configurations described later.

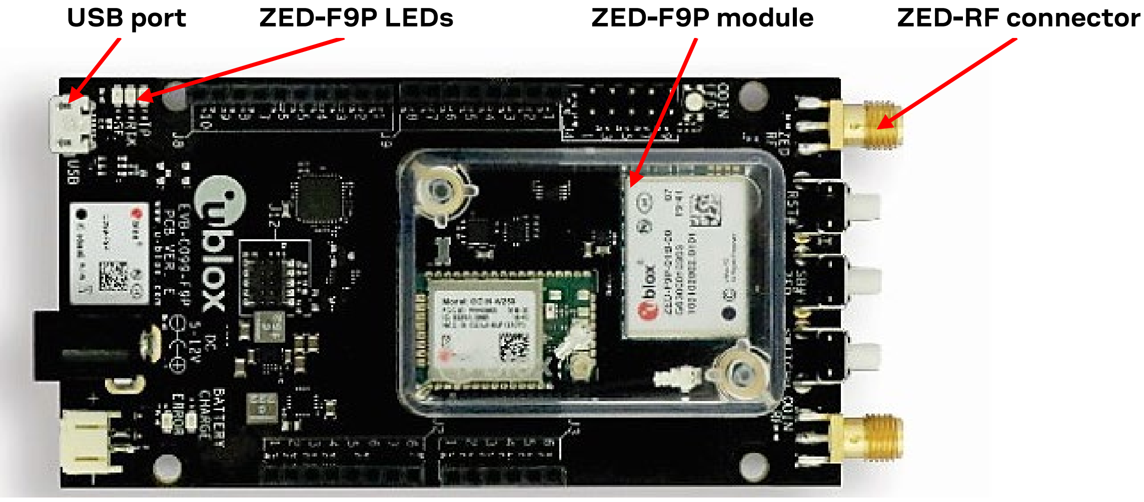


Figure 2: Basic C099-F9P overview with details needed for quick start

2.1 Starting up

- Connect the supplied multi-band GNSS antenna to the ZED-RF SMA connector. Ensure good signal reception.
- Connect the USB to a Windows PC; this will power the board. The FTDI and USB drivers will be installed automatically[2] from Windows Update when the user connects the board for the first time. Note that the board has current limitation functionality on USB. Thus, ZED-F9P and ODIN-W2 modules will power up after the drivers have been successfully installed and the USB enumeration is completed.
- Start u-center and connect to the COM port identified as **C099 application board, ZED-F9P** using Device Manager. Set the baud rate to 460800 baud. See section 4.3.1 for detailed instructions.
- The time pulse LED on the C099-F9P board will blink in blue once the ZED-F9P has obtained valid time information. Figure 3 below shows a typical u-center view with active satellite signal levels.

To operate the ZED-F9P in RTK mode, the GNSS antenna must be placed in an open environment and the unit must be connected to an RTK correction service. Where available, the evaluation kit comes with a free trial of the SmartNet correction service. Consult the leaflet included with the kit for information on how to register for the service and how to obtain mount point and user connection details before moving to the next steps.

RTK corrections can be applied using a u-center built-in NTRIP client. To use the C099-F9P board with a correction service follow these next steps:

- In u-center, click on the **Receiver** menu item.
- Select **NTRIP Client**…
- Fill in the settings for the **NTRIP caster**, **username** and **password**.
- Click **Update source table** and select the recommended NTRIP mount point.
- Click **OK** to close the dialog and connect to the service.
- In the **Data View** of u-center, the **Fix Mode** should change from **3D** to **3D/DGNSS** when RTCM corrections are received. The RTK LED will blink in green.

[2] For manual driver installation, check GNSS Sensor and VCP Device Driver User guide in Related documents

- Eventually, the status will change to **3D/DGNSS/FIXED** and the RTK LED will show a steady green light.

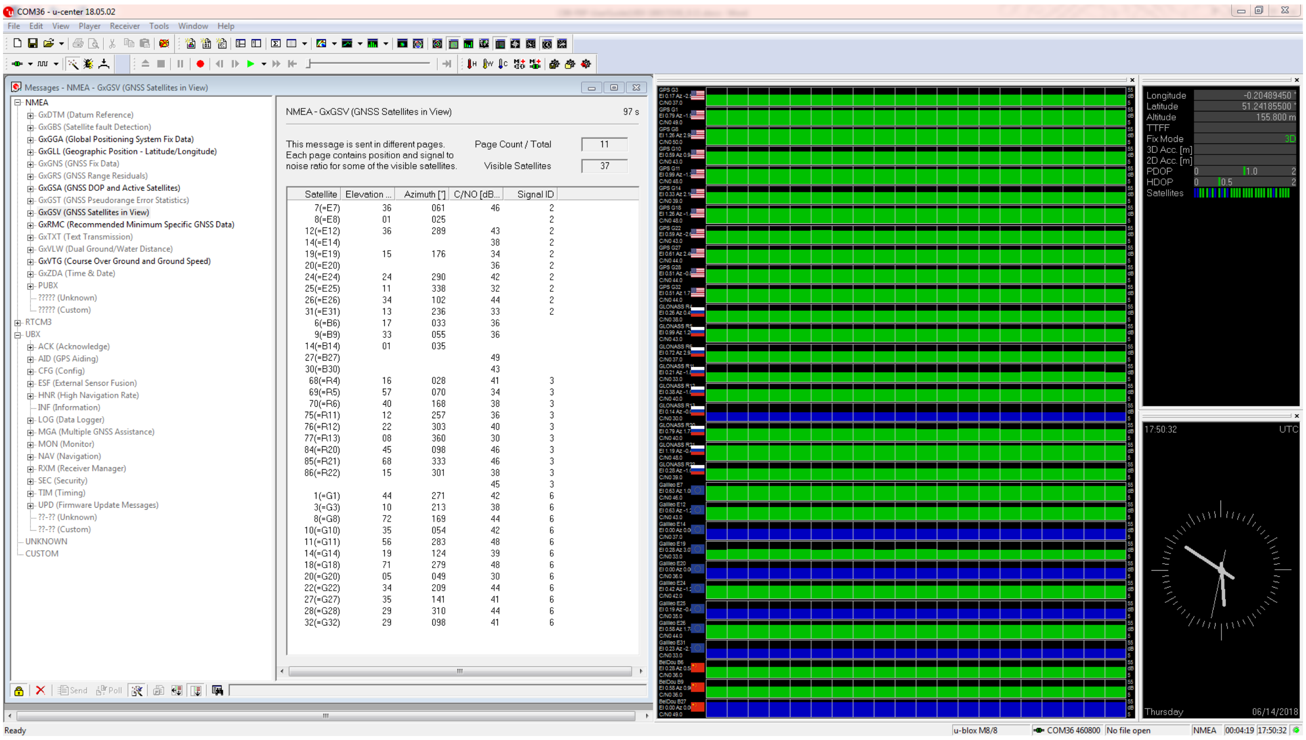


Figure 3: u-center showing a view of the ZED-F9P default operation

3 C099-F9P description

3.1 Component overview

The C099-F9P houses the ZED-F9P RTK high precision positioning module and an ODIN-W2 module for wireless short-range communications. An FTDI component provides dedicated COM port connections with the ZED-F9P and ODIN-W2 via a USB connector.

The board can be powered by USB, a DC supply socket, or by a Li-Po (lithium polymer) battery. The board has been designed using an Arduino form factor with the modules' serial ports routed to the shield headers. Note that a secondary USB power source is available via the USB-to-DC plug adapter cable.

The block diagram in Figure 4 shows the logical signal flow between the individual parts.

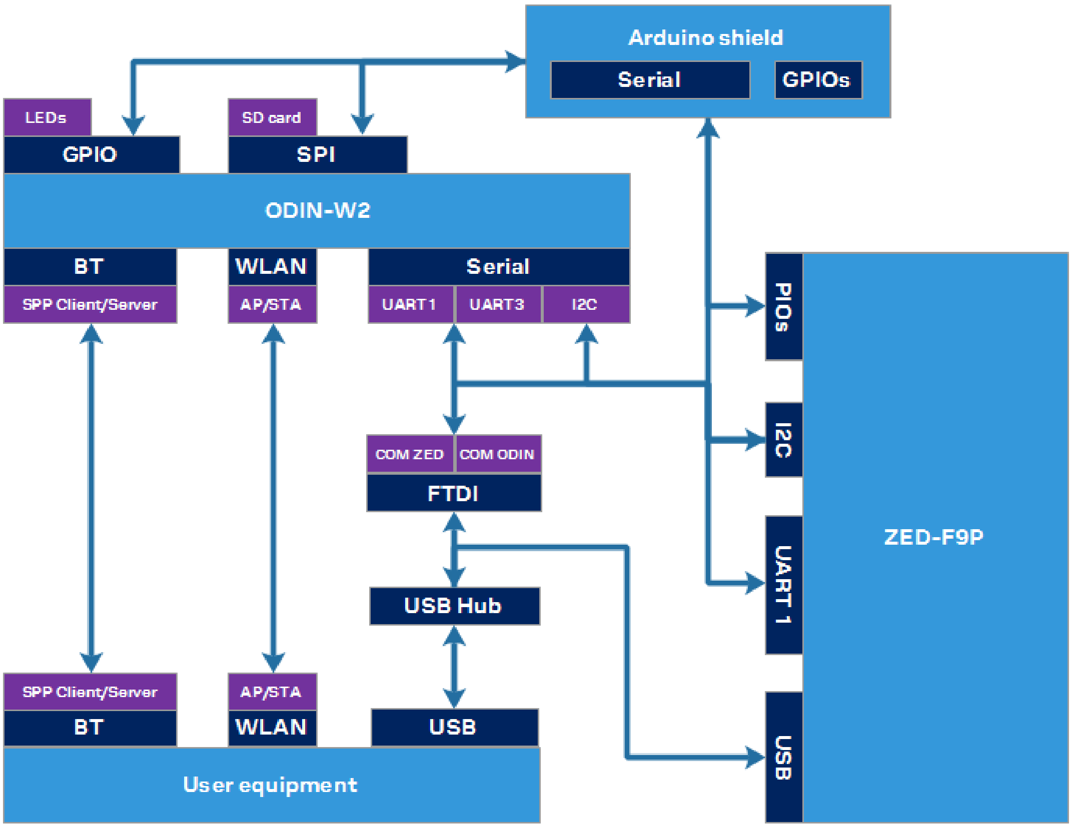


Figure 4: C099-F9P block diagram

3.2 Component identification

The following images show the position of major parts and user interfaces.

- Main components – Figure 5
- Switches and LEDs – Figure 6

Their functions are described later on in this section.

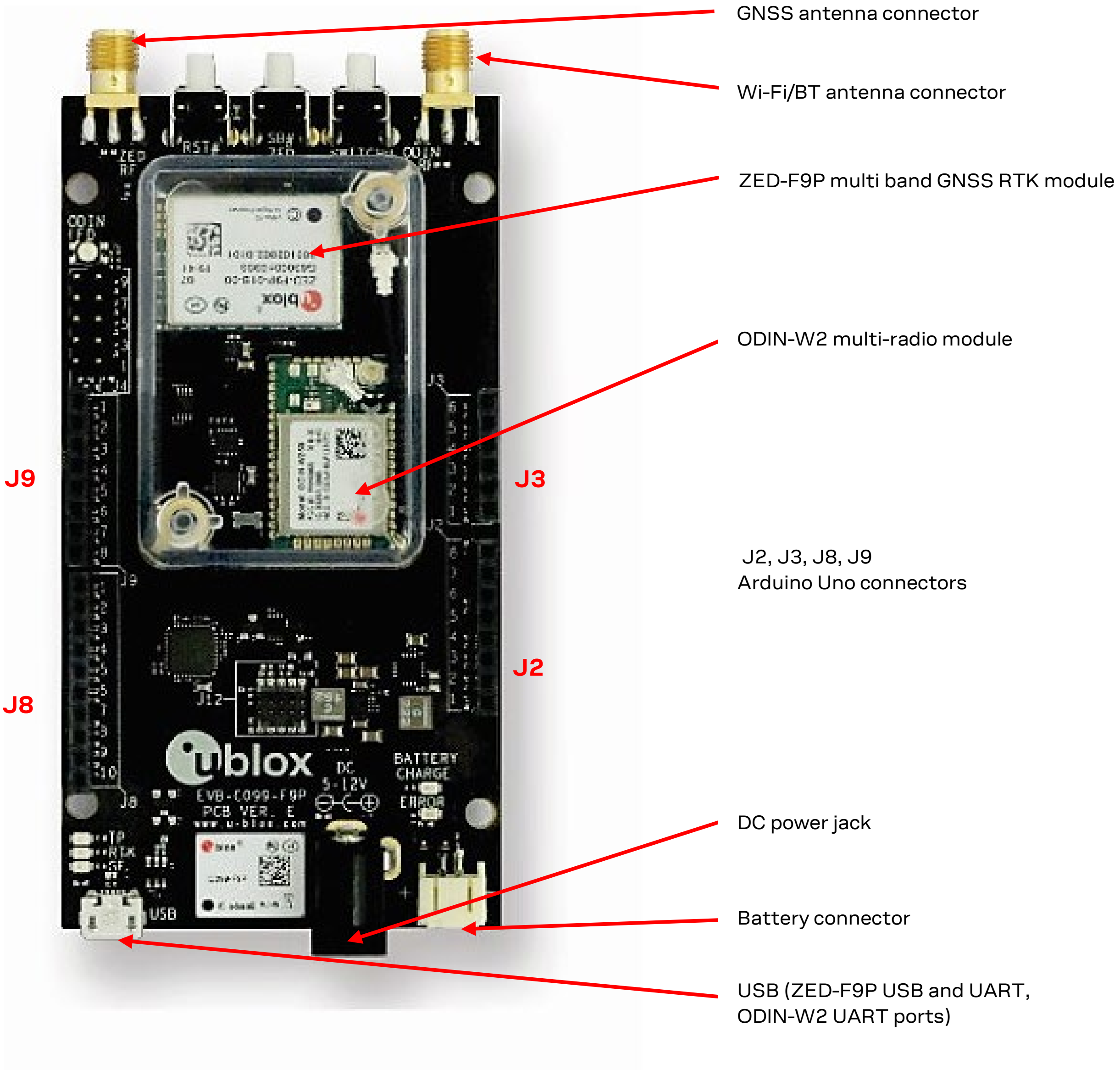


Figure 5: Main components and USB ports

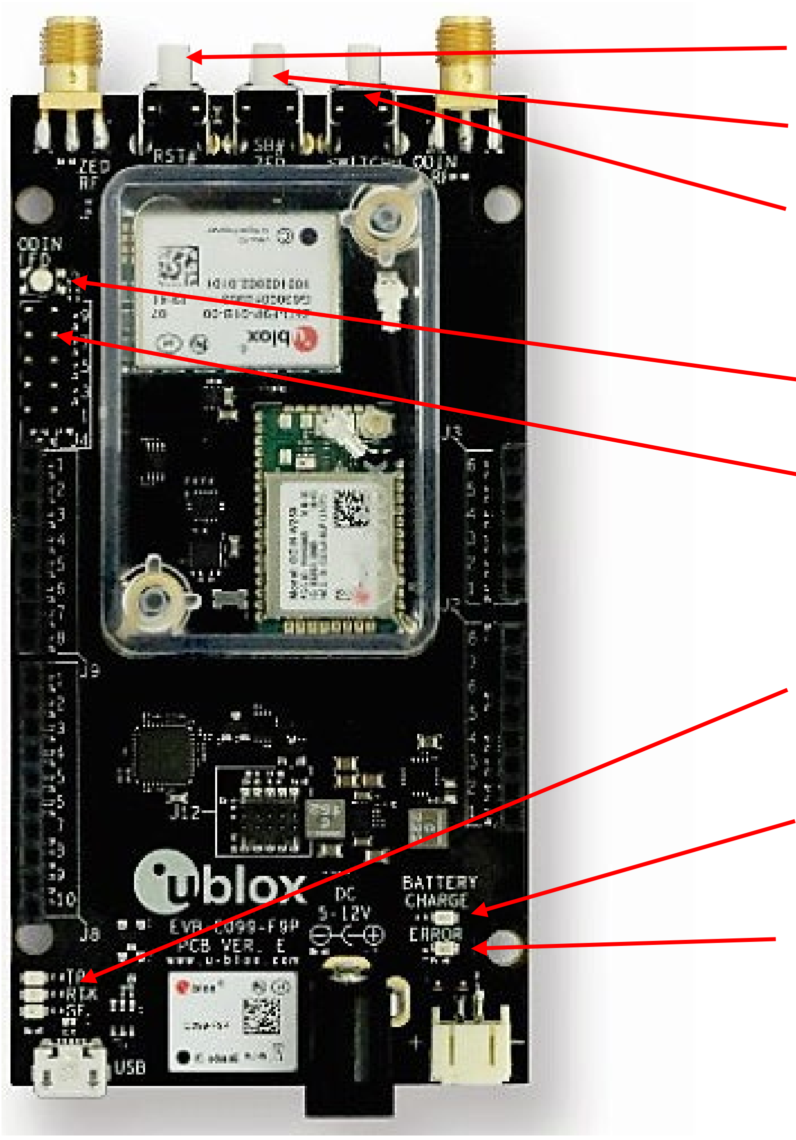


Figure 6: Switches and LEDs

☞ The MicroSD card slot is not used in this version of the board. The ODIN-W2 Switch 0 interrupt is not required for normal customer use.

3.2.1 ZED-F9P status LEDs

The board provides three LEDs to show the ZED-F9P status. The location of the LEDs is shown in Figure 7 below.

The RTK status LED provides an indication of the state of the ZED-F9P module RTK-STAT pin.

- At start-up the LED is off.
- When a valid stream of RTCM messages is being received and utilized, but no RTK fixed mode has been achieved, the yellow LED flashes.
- When in RTK fixed mode, the yellow LED is turned on.

The blue time pulse LED will flash at the default 1 Hz rate when the time solution is valid.

If activated, the Geofence status LED indicates the current Geofence status, i.e. in or outside a designated area.

See the ZED-F9P Interface description [1] for help with configuring the time pulse output or activating the Geofence pin.

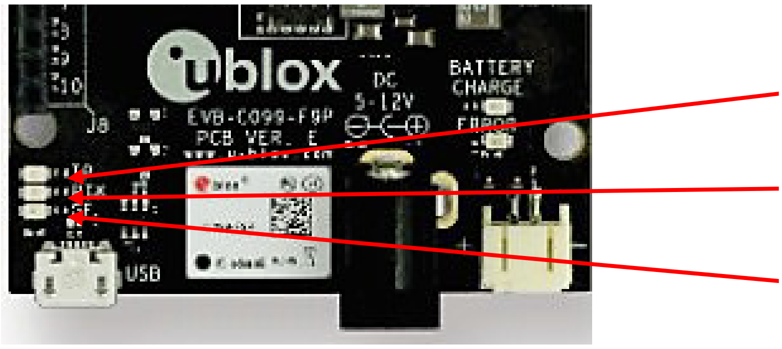


Figure 7: ZED-F9P LEDs

3.2.2 ODIN-W2 activity LED

The ODIN-W2 module uses a multi-colored LED to show particular activity status. This is positioned adjacent to the ZED-F9P reset switch and shown below in Figure 8. The activity status is summarized in Table 1 below.

Mode	Status	LED color
Data mode, EDM	IDLE	Green
Command mode	IDLE	Orange
Data mode, Command mode, EDM	CONNECTING	Purple
Data mode, Command mode, EDM	CONNECTED[3]	Blue

Table 1: ODIN-W2 u-connectXpress software LED activity states and colors

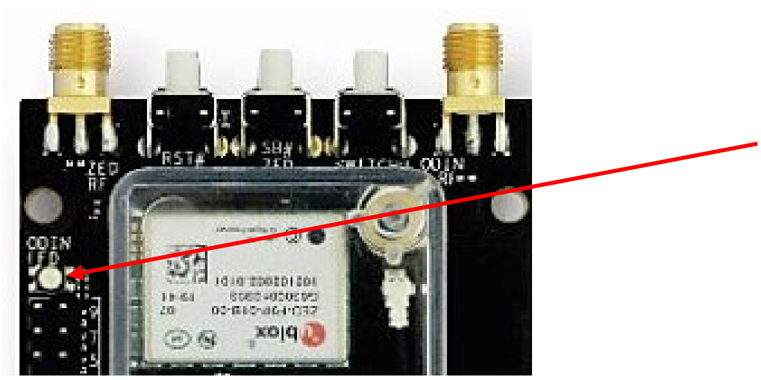


Figure 8: ODIN-W2 Activity LED position on C099-F9P board

[3] On data activity, the active LED flashes.

4 Using the C099-F9P

The C099-F9P is shipped with the latest HPG firmware for the ZED-F9P GNSS module. Information on updating either module's firmware is provided in section 7 Firmware update, if required.

4.1 Powering the board

The board can be powered from a variety of sources:

- The USB connection
- A 3.7 V Li-Po Battery via a JST connector
- An external 6-12 V DC source via a 2.1mm connector; center pin V+. Also, the included USB-to-DC plug adapter cable can be used to provide an additional USB power source.

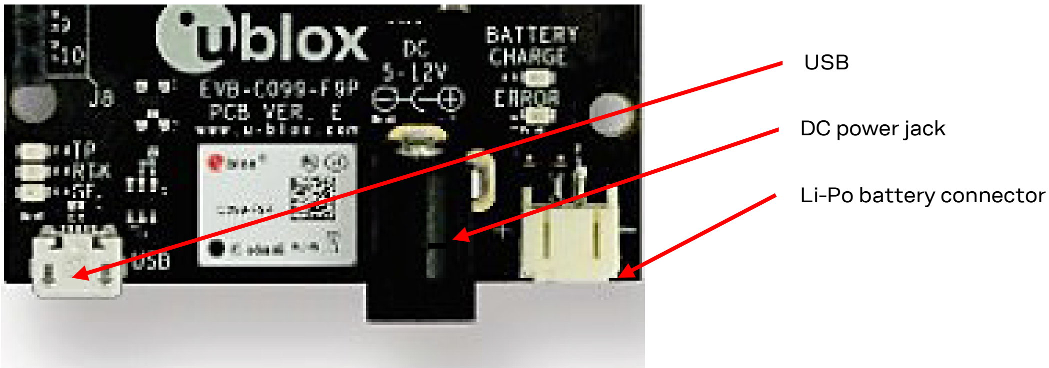


Figure 9: Power connections

Figure 10: Typical single-cell 3.7 V Li-Po battery with JST connector

⚠ Follow all published safety advice for using bare cell Li-Po batteries while charging and protecting them from mechanical damage. Fire risk can occur if the advice is not followed.

⚠ Ensure correct polarity on the JST battery connector. In case of an incorrect polarity, the incorrect polarity LED will be on. Due to the polarity protection feature, the supply rails will not be powered.

All supply connections are fed via a Schottky diode to the main supply bus to allow multiple sources to be connected in parallel. The Li-Po battery will be charged from either the DC power source or the

USB power source. The charging status is indicated by a red LED which is on during charging and turned off when fully charged.

When less than 500 mA is available from the USB host, ensure sufficient extra supply via the DC power jack. Note that due to the higher current consumption caused by the battery charging it is not recommended to charge the battery via USB only.

☞ Supplying through the USB port requires the power source (USB host) to support the USB enumeration process. If the power source is not capable of enumeration, you may use the provided USB-to-DC adapter cable and connect it to the DC plug. There is no current limitation for the DC supply.

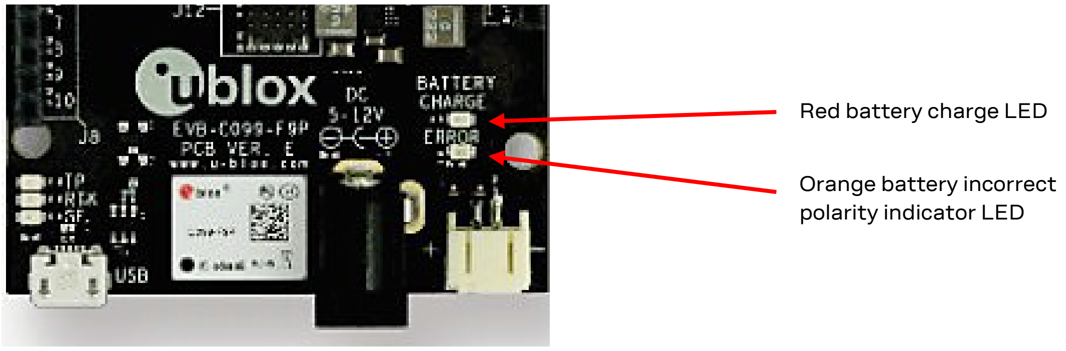


Figure 11: Battery charge status LED

4.1.1 Non-wireless operation

For use-case scenarios where non-wireless data link is needed the ODIN-W2 can be disabled. In order to disable the ODIN-W2, connect the safeboot jumper which forces the ODIN-W2 into safeboot mode during the device start-up. See Figure 6 to locate the safeboot pins.

On average, the ODIN-W2 consumes less current when started in the safeboot mode. In addition, the safeboot mode ensures that no intentional radiation originates from the 2.4 GHz antenna connector.

4.2 GNSS RF input

The C099-F9P board should be used with the antenna supplied with the kit. If another active antenna is used, be aware that the RF input has a bias output designed to supply 3.3 V DC with a 70 mA maximum current load. A DC block is advisable if the board is connected to a signal distribution scheme or GNSS simulator to prevent any potential shorting of the antenna bias.

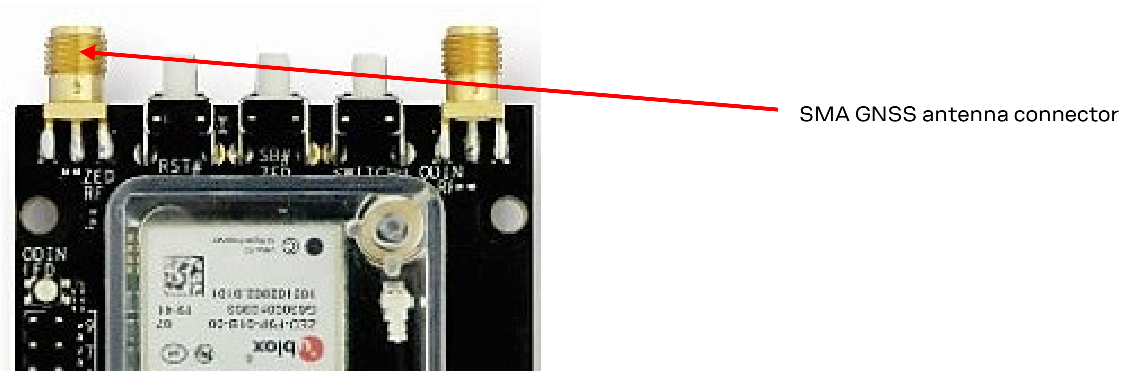


Figure 12: GNSS antenna connector

When using the supplied antenna it is advisable to use the ground plane provided. Otherwise ensure that there is an adequate ground plane, e.g. by mounting in the center of a metallic car roof.

Figure 13: The supplied GNSS multi-band antenna

4.3 User interfaces

The C099-F9P has a number of fixed connection options besides the wireless modes. There is also an additional Arduino R3 / Uno interface for external host connection.

The USB connector on the board provides connection via an on-board hub providing:

- An FTDI USB bridge to ZED-F9P UART1 and ODIN-W2 UART COM ports.
- Dedicated connection to the ZED-F9P USB port.

4.3.1 FTDI USB bridge

When the USB cable from the user's PC is connected, a driver will load and set up two virtual serial ports, as shown below in Figure 14. Additionally, a further serial VCP will be created to provide a direct connection with the ZED-F9P USB port.

☞ Ensure that the PC is connected to the internet to load the drivers from Windows Update.

The first of these is connected to the ZED-F9P serial port and should be selected with u-center. The second serial device is for the ODIN-W2 module when using s-center. In Figure 14 the ODIN-W2 connection is the first port (COM 62) and the ZED-F9P connection is the second port (COM 64). Port numbering can be different between individual PCs, but the same arrangement applies.

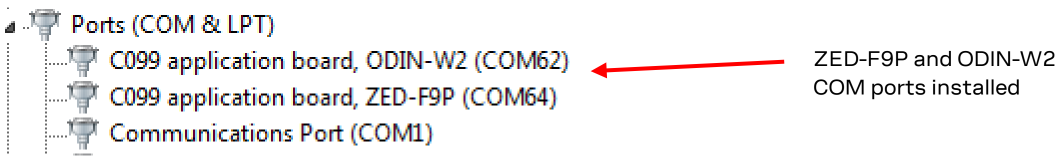


Figure 14: Windows Device Manager COM port view

In addition, a third VCP will be created corresponding to the ZED-F9P USB port. Windows 10 users will see a new VCP device in the Device Manager window as it will load an in-built driver. With older Windows installations, a driver will be loaded via Windows Update. In this case the device will be identified as a u-blox GNSS device in the Device Manager window.

Open u-center, select the ZED-F9P serial port, and set the baud rate to 460800 to match the ZED-F9P default UART setting. Once connected, u-center shows typical received signal levels from multiple GNSS bands, see Figure 15 below.

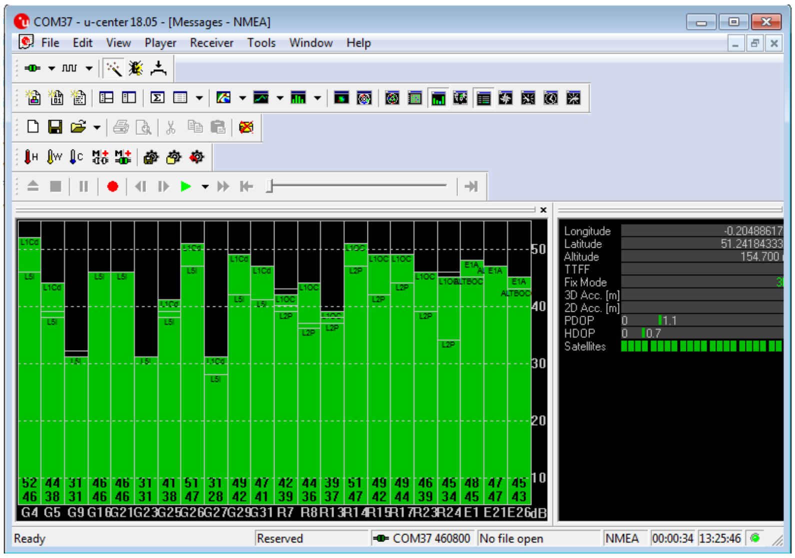


Figure 15: u-center view with ZED-F9P connected

Additional UBX protocol messages can be enabled to view additional information in u-center. For example, the following are typical messages the user can poll or enable for periodic update.

- UBX-NAV-HPPOSLLH
- UBX-NAV-RELPOSNED
- UBX-NAV-SIG
- UBX-NAV-PVT
- UBX-NAV-STATUS
- UBX-NAV-SVIN

For help with the Message view, see u-center User guide [3].

4.3.2 Bluetooth serial COM port connection

Before using Bluetooth ensure that the supplied Wi-Fi/Bluetooth antenna has been connected to the SMA connector “ODIN-RF” to ensure correct operation of the wireless functions.

- Create the u-blox configuration file for the rover BT link. Use the “u-blox ODIN-W2 BT Rover.txt” file listed in Appendix D. You can also download the file from Github: https://github.com/u-blox/ublox-C099_F9P-uCS/tree/master/odin-w2
- For information on how to upload configuration file using s-center, see section 6.1.1 Configuring a C099-F9P rover for Wi-Fi operation.

On the PC, go to the Bluetooth setup and in the Windows Add a device window, add the ODIN-W2 module as a device, identified as “ODIN-W2-XXXX”, by selecting ODIN-W2 and clicking **Next**. See Figure 16 and Figure 17 below.

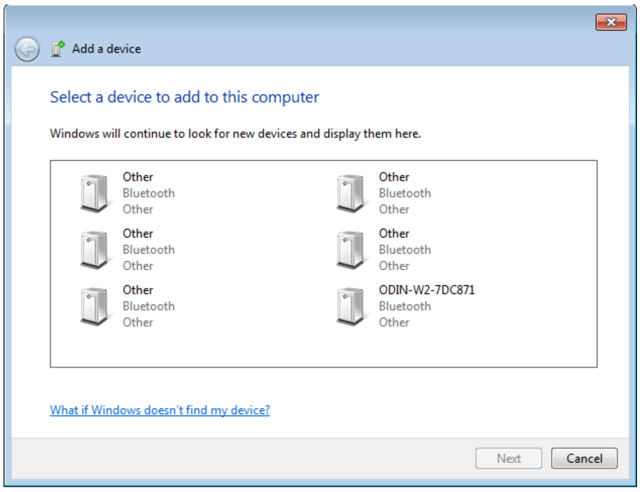


Figure 16: Windows 7 Add a device window shows ODIN-W2

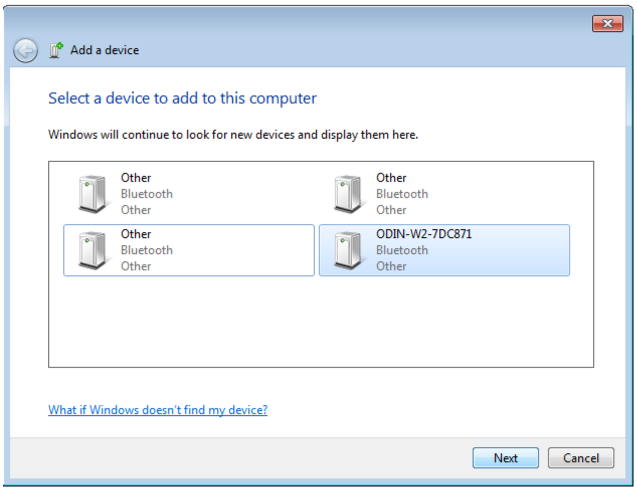


Figure 17: Click on the ODIN-W2 and select Next

You can locate the device by examining the Bluetooth connections under the Ports tab in the Windows Device Manager. Search for a “Standard Serial over Bluetooth link” - usually the first one on the list. Use this device for connecting the ZED-F9P to u-center.

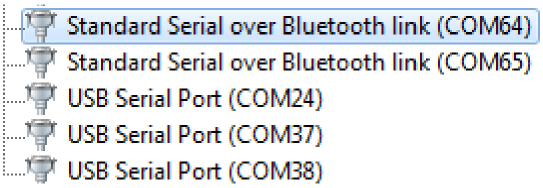


Figure 18: Installed Bluetooth SPP port

The ODIN-W2 module communicates with the ZED-F9P via a serial port which is shared with the FTDI USB/COM port via multiplexors. Once Bluetooth communication is established with the ODIN-W2, a jumper connection should be made at position “3OE” to connect the serial ports of the ZED-F9P and ODIN-W2 together. See Figure 19 below.

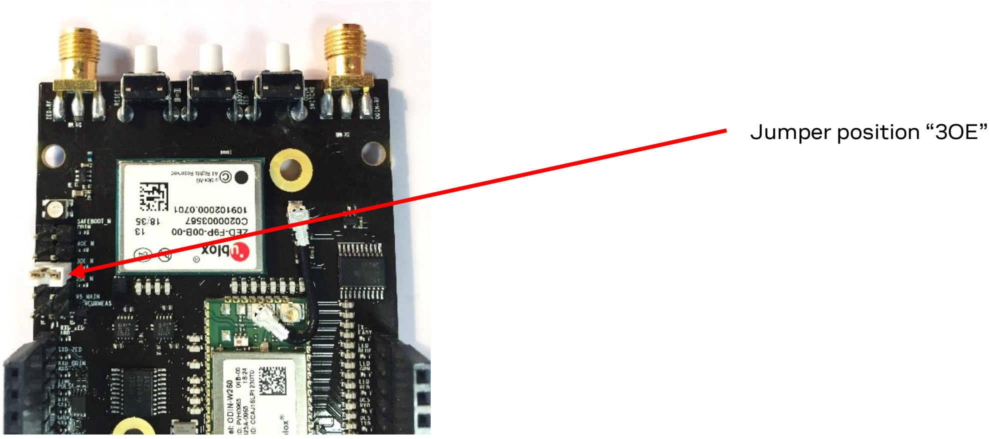


Figure 19: C099-F9P rover jumper position

For information, Figure 20 below shows the C099-F9P logical connections for serial interfaces with the “OE3” jumper set as required to connect the ODIN-W2 and ZED-F9P serial ports.

UART1 MODE:

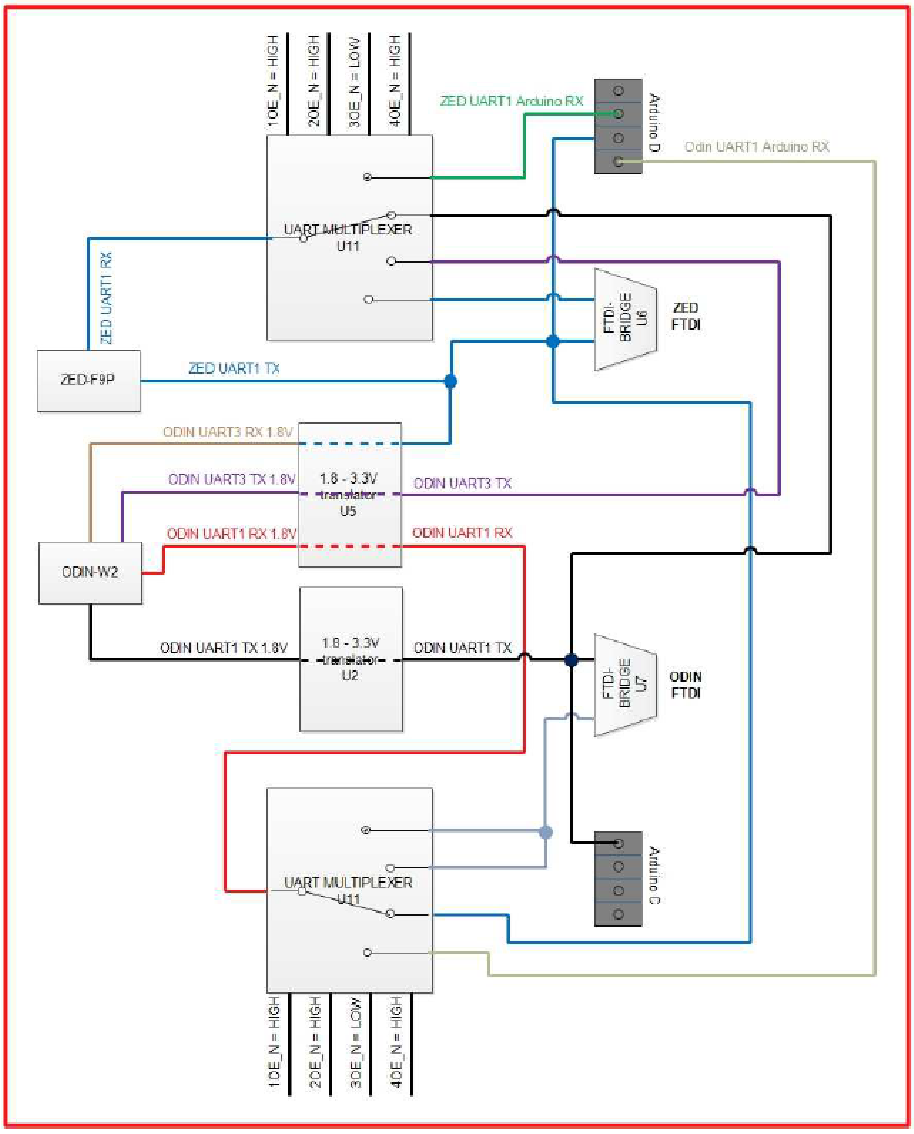


Figure 20: Schematic showing serial interface connection with jumper OE3 setting

4.3.2.1 Windows OS issues with Bluetooth SPP

There are some known issues with the Windows Bluetooth Serial Port Profile (SPP) implementation for Windows 7-10. Symptoms include the Bluetooth Virtual COM port not installing or applications not connecting to the Bluetooth Virtual COM port. In other cases Windows might crash or become un-responsive. This is not related to the ODIN-W2 Bluetooth implementation that uses the Bluetooth standard SPP.

Figure 21: ASUS USB-BT400

A known industry fix is to not use the Windows Bluetooth stack and PC Bluetooth hardware. This is done by using a USB Bluetooth adapter that uses its own Bluetooth stack. A device that is known to work is the ASUS USB-BT400 (USB 2.0)**.** Once installed use the Bluetooth Virtual COM port assigned to this device and not the built-in Bluetooth.

5 Rover operation using NTRIP

This section shows how the ZED-F9P is used as a rover using correction information provided over the internet using NTRIP. This is usually provided by a host from a single reference station or as a Network RTK Virtual Reference Service (VRS).

A suitable host is a PC with internet access. A host runs an NTRIP client and streams RTCM corrections to the C099-F9P through a UART or Bluetooth connection. Messages transmitted through a Bluetooth or Wi-Fi link are forwarded to I2C bus and vice versa. The user is advised to enable desired messages in both UART and I2C interfaces in ZED-F9P.

5.1 PC hosting via u-center

The u-center application includes an NTRIP client for PC hosting. The u-center User guide [3] provides help when setting NTRIP service connections. Users can connect via Bluetooth for wireless operation or directly via a serial COM port. Once the service is active, RTCM corrections are sent over the connection and data can be logged as usual with u-center.

The u-center User guide [3] provides more information concerning NTRIP connections. Enter the required connection settings using the client setting window show below.

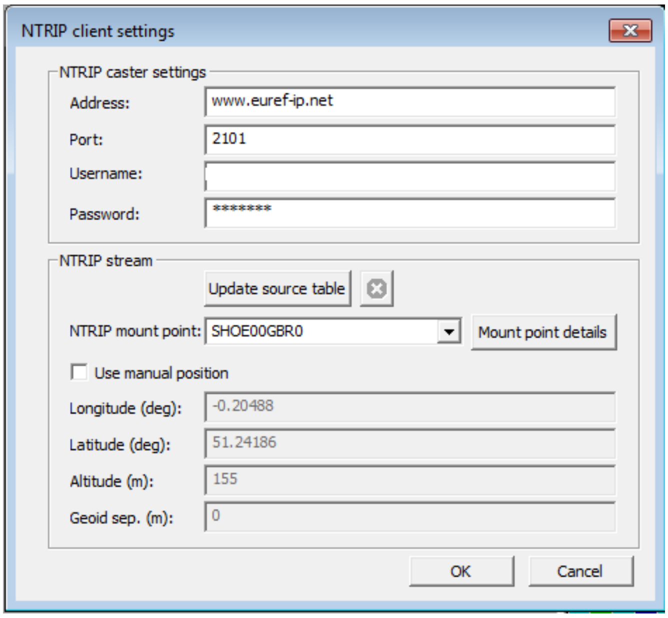


Figure 22: u-center NTRIP client view

Ensure that the NTRIP client connection icon is green. This indicates a successful NTRIP connection and that RTCM data is transferred to the C099-F9P.

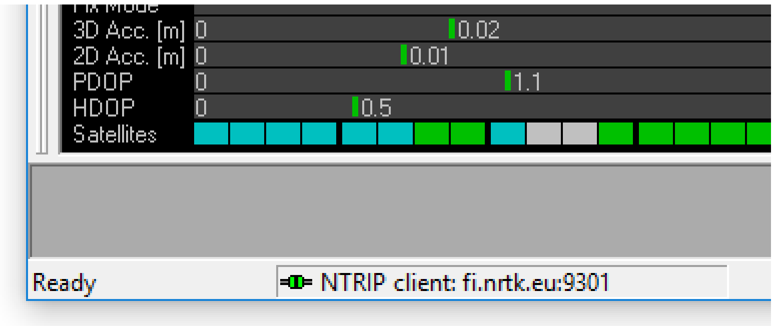


Figure 23: u-center NTRIP client communication indicator

Confirm that the rover has obtained RTK fixed mode in the u-center Data view:

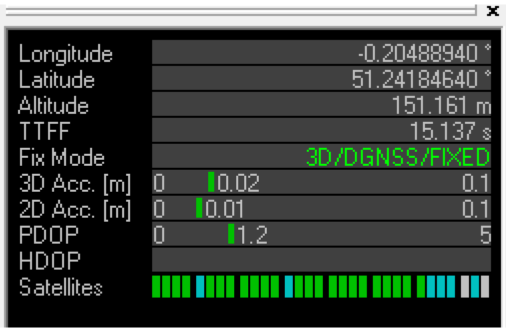


Figure 24: u-center Data view RTK FIXED indication

5.2 Mobile hosting

A portable rover option is offered by an Android application which utilizes Bluetooth connection to a single C099-F9P. An example application is provided by Lefebure and it is available from Google Play Store: https://play.google.com/store/apps/details?id=com.lefebure.ntripclient.

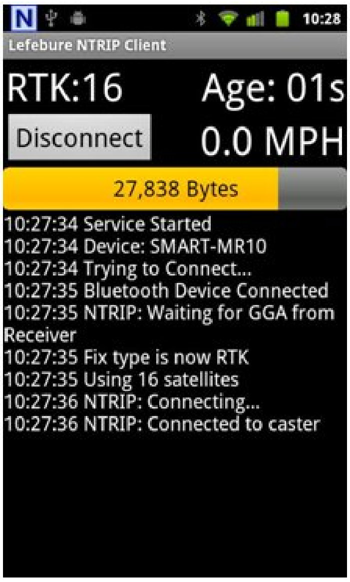


Figure 25: Lefebure Android NTRIP client

5.3 Pairing the host with the C099-F9P

For both options the user needs to pair the host (PC or mobile) with the C099-F9P ODIN-W2 wireless module.

Once paired the user can then attach the host application to the C099-F9P to send and receive data.

☞ See Section 4.3.2 Bluetooth serial COM port connection for pairing information.

6 Reference station and rover pairing

This section is provided for users with two C099-F9P boards and provides configuration information when setting up a C099-F9P as a reference station to provide local RTCM corrections for a C099-F9P rover. This connection uses Wi-Fi connectivity to maximize range for untethered operation.

6.1 Wi-Fi connection between two C099-F9P boards

This set-up relies on establishing a peer-to-peer Wi-Fi connection between two C099-F9P boards for short base-line applications, e.g. drones and the like.

Separate ODIN-W2 configuration files are required to enable the reference station and rover C099-F9P boards to operate as an Access Point and client respectively. Ensure the ODIN-W2 on the rover and reference station runs the u-blox u-connectXpress software.

Prior to use, the reference station C099-F9P needs RTCM3 output messages enabled and its position surveyed-in. When the device is surveyed-in, it will enable output of the RTCM3 1005 message to enable the rover to begin RTK operation. Consult the Integration manual [2] for information relating to reference station operation for more information.

In this example the C099-F9P reference station sends corrections to a C099-F9P rover and the rover transmits NMEA and UBX messages back to the base. The rover operation can be viewed remotely with u-center connected to the reference station's ODIN-W2 COM port.

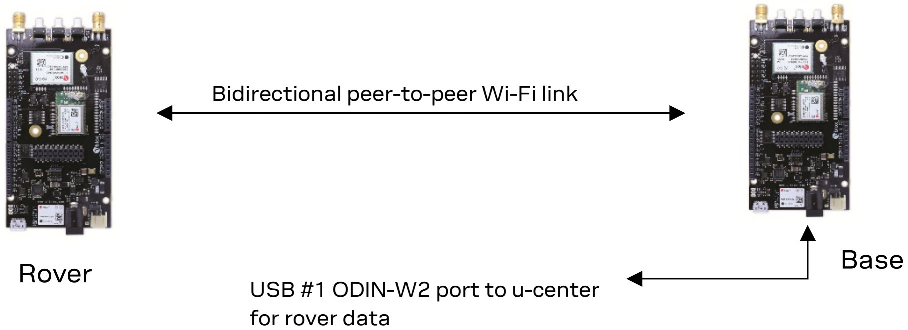


Figure 26: Reference and rover C099-F9P set up

The sub-sections below describe the steps required to configure the boards for Wi-Fi operation plus the settings needed for rover and base operation.

6.1.1 Configuring a C099-F9P rover for Wi-Fi operation

The following steps provide guidance on configuring the C099-F9P ODIN-W2 Wi-Fi for rover operation:

☞ Disconnect any UART multiplexor jumper connections before proceeding.

- Connect the rover unit via USB to a PC.
- Install the u-blox s-center evaluation application.
- Open s-center which will show the following view:

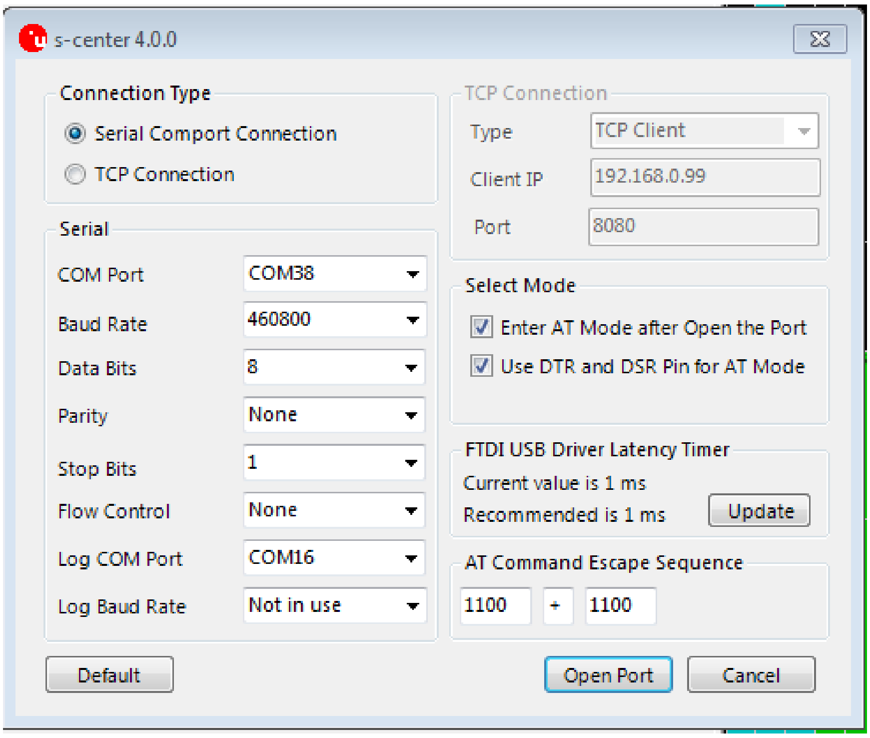


Figure 27: s-center connection setting window

- Select the COM port installed for the ODIN-W2.
- Set the baud rate to 460800 baud.
- Ensure hardware flow control is not enabled.
- Click on the "FTDI USB Latency Timer" **Update** button.
- Click **Open Port**.
- If the C099-F9P is powered, the ODIN-W2 responds with AT commands.

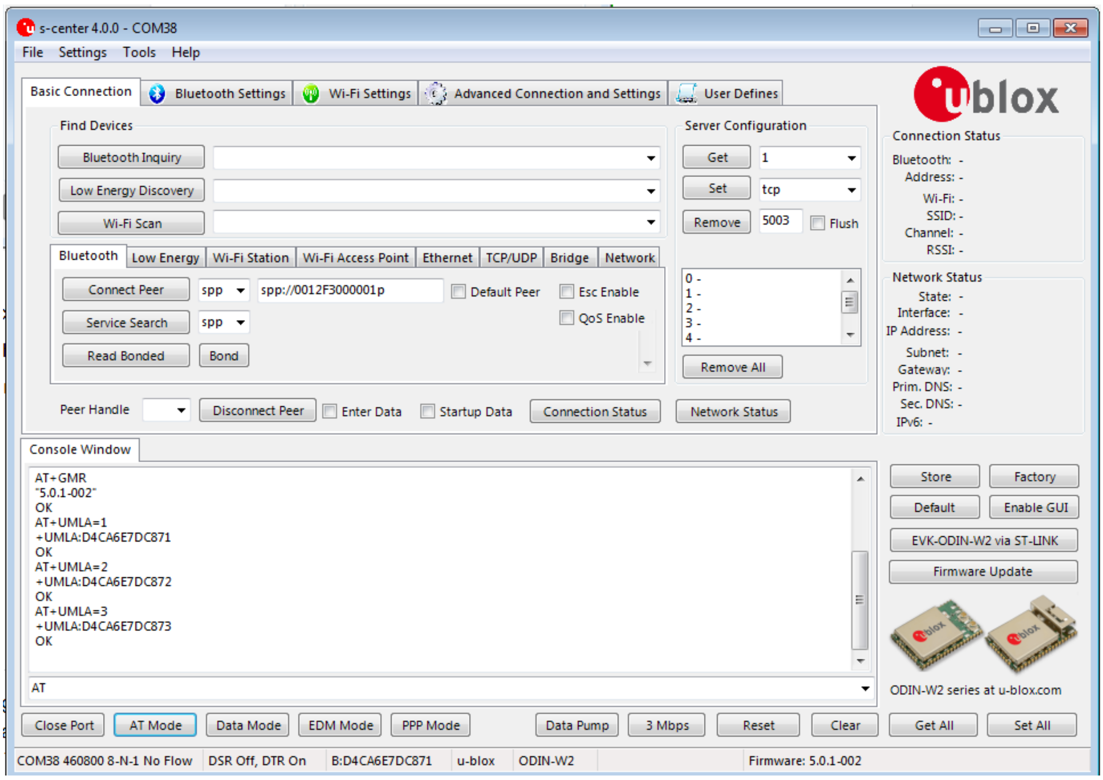


Figure 28: s-center connected to ODIN-W2

It is important to do a factory reset on the ODIN-W2 before downloading a new configuration file. Click the **Factory** button in the same window to perform a factory reset.

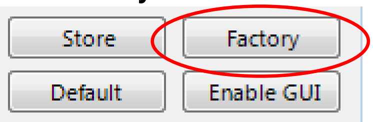


Figure 29: s-center factory reset button

After factory reset, the device will be set with a baud rate of 115200 baud with hardware flow control enabled. You must change this to no hardware flow control:

- First set s-center to 115200 baud and no flow control.
- Open the COM port.
- Select **EVK-ODIN-W2 via ST-LINK** button as shown below to disable flow control.

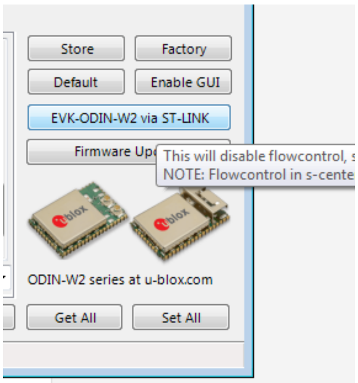


Figure 30: Resetting ODIN-W2 to no flow control

Click the **AT Mode** button to ensure it is responding correctly. You will see it respond with AT commands if communication is OK.

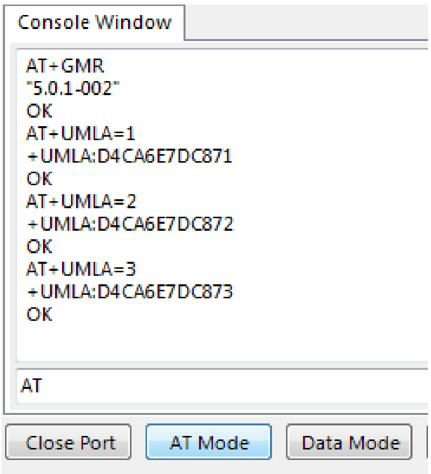


Figure 31: Clicking AT Mode button

Download the u-blox configuration file for the rover Wi-Fi link. Use the "Rover ODIN-W2 Access Point UDP Server.txt" file listed in Appendix D. You can also download the file from Github: https://github.com/u-blox/ublox-C099_F9P-uCS/tree/master/odin-w2

Select **File** > **Download Configuration**.

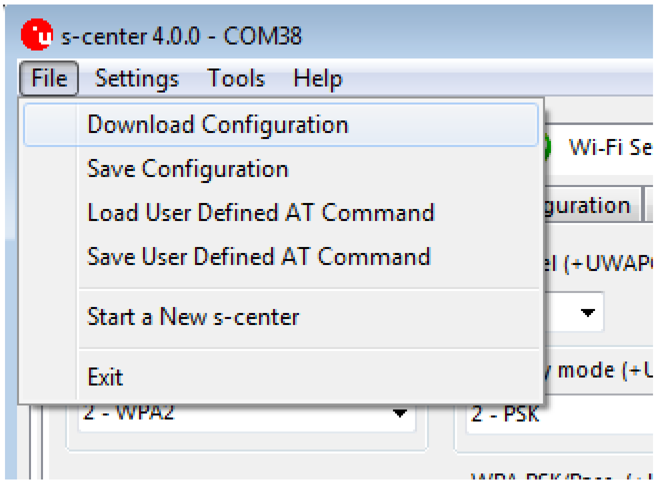


Figure 32: Selecting File > Download Configuration

Select the "Rover ODIN-W2 Access Point UDP Server.txt" file and click **Open**.

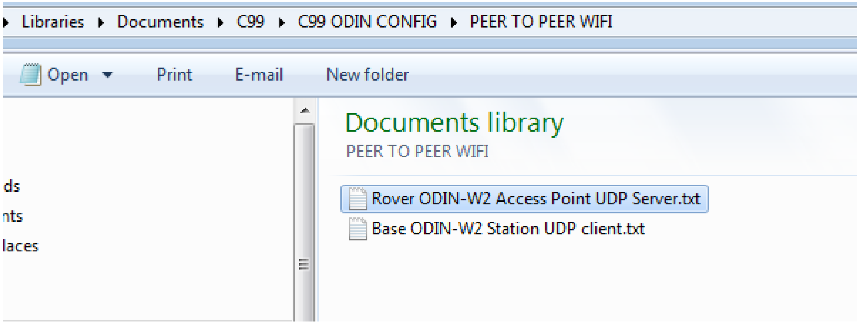


Figure 33: Selecting file "Rover ODIN-W2 Access Point UDP Server.txt"

Disconnect s-center from the ODIN-W2 port and toggle the C099-F9P off and on again to ensure it will be using the new configurations as default.

Position a jumper as shown in Figure 20 to connect the ZED-F9P and ODIN UARTs. This will enable correction traffic from the rover and provide a return path for messages from the rover.

Connect the GNSS antenna, ensure use with the supplied ground plane and place in good GNSS visibility conditions.

In order to prevent the ODIN-W2 from mistranslating NMEA and UBX streams, it is advisable to reprogram the factory default escape sequence '+++' as described in the AT command manual [5].

6.1.2 Configuring a C099-F9P reference station (Base) for Wi-Fi operation

The following steps describe setting up the C099-F9P ODIN-W2 Wi-Fi for reference station operation.

☞ Disconnect any jumper connections before proceeding.

Follow the same process for configuration described above in section 6.1.1 Configuring a C099-F9P rover for Wi-Fi operation **except** load the reference station configuration file "Base ODIN-W2 Station UDP client.txt" instead - see Appendix E for the file listing.

After this the C099-F9P reference station will require setting up as shown below to enable sending correction data to the rover.

6.1.3 ZED-F9P reference station (Base) and rover configuration

With the latest version u-center, connect to the C099-F9P using the dedicated ZED-F9P USB connection.

See section "Required configuration of the base and rover" in the ZED-F9P Integration Manual [2] for details on configuring the required RTCM3 messages and setting the ZED-F9P as a reference station. We provide easy-to-use configuration files to download, as detailed in the next section.

☞ Ensure all RTCM messages are set to transmit from UART1 and the baud rate is set to 460800, otherwise the ZED-F9P and ODIN-W2 cannot communicate. Wrong settings can occur if the ZED-F9P firmware is updated or the ZED-F9P UART1 is set to its default state.

☞ Ensure that the UART1 port protocols are set to "None" for input and "RTCM3" for output to prevent input of the received rover messages.

☞ Place a jumper at position "OE3" as shown in Figure 19, this will connect the ODIN-W2 and ZED-F9P UARTs to provide transmission of RTCM messages to the rover.

6.1.3.1 Downloading Base ZED-F9P configuration file

Download the configuration files from: https://github.com/u-blox/ublox-C099_F9P-uCS

Or save the contents of Appendix F to a .txt file. Open u-center **View** > **Generation 9 Configuration View**:

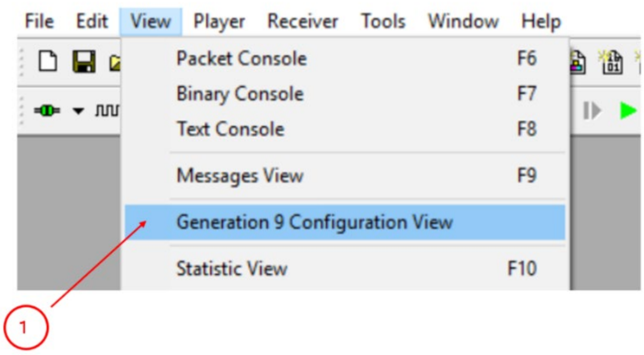


Figure 34: u-center View > Generation 9 Configuration View

Select **Advanced Configuration**:

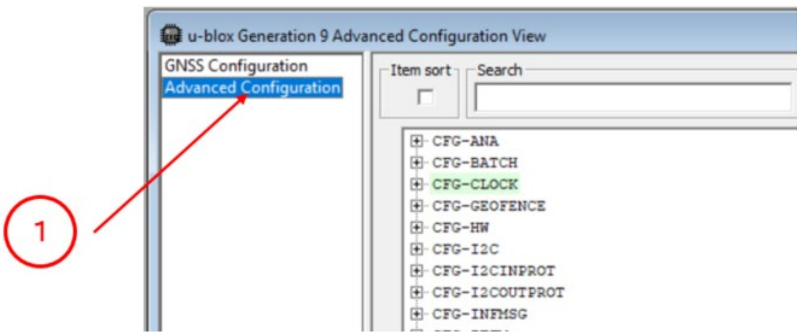


Figure 35: u-center View > Generation 9 Configuration View > Advanced Configuration

Important next step – return receiver to defaults by selecting the icon in the Action toolbar (see number 1 in Figure 36):

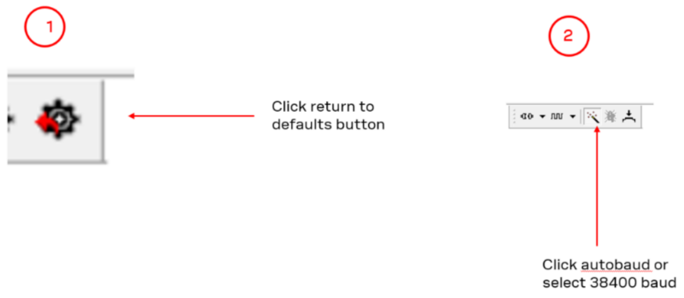


Figure 36: Return receiver to defaults and select 38400 baud

Select **Load** to load the "F9P Base config C99.txt" file and **Send** to send the configuration:

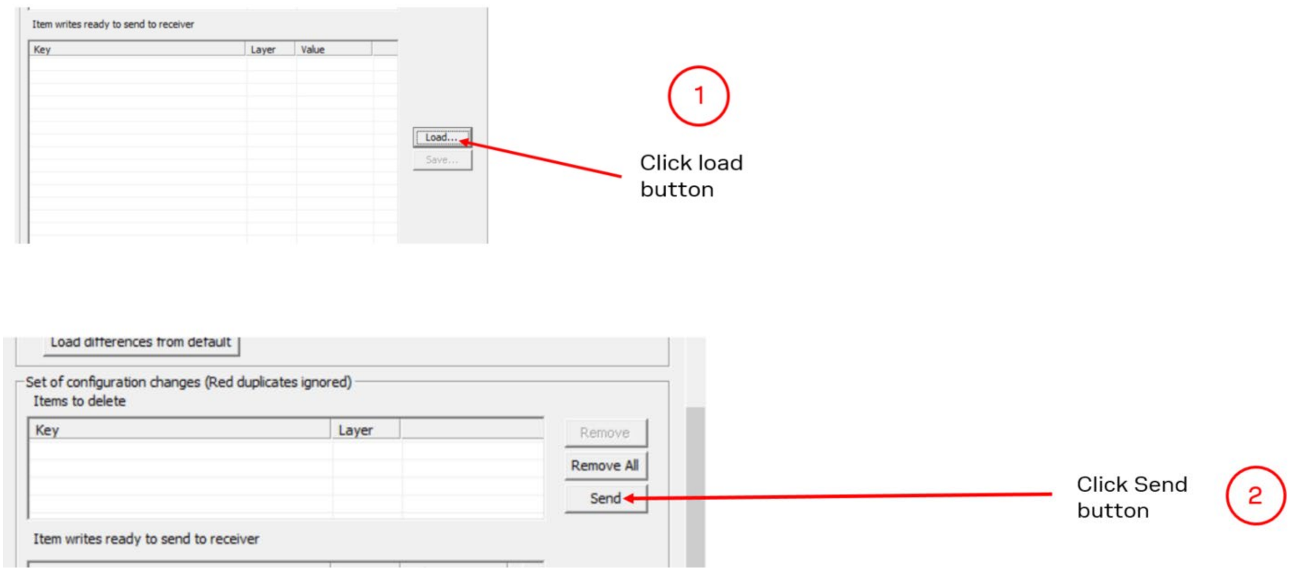


Figure 37: Load "F9P Base config C99.txt" file and click Send

Keep the USB connected to the PC, however disconnect u-center from the ZED-F9P USB port and connect to the ODIN-W2 USB Virtual Com Port. This will allow viewing and logging of the rover C099-F9P message data via the return Wi-Fi link.

Connect the GNSS antenna, ensuring use with the supplied ground plane and place in good GNSS visibility conditions.

Now load the "F9P Base Survey in start.txt" file in the same way, except do not return the receiver to default settings, as we have a working configuration. It should carry out the Survey-In process and then output all the required RTCM messages.

6.1.3.2 Downloading Rover ZED-F9P configuration file

Connect the Rover ZED-F9P via the dedicated USB connection.

Load and Send the "F9P Rover config C99.txt" file as shown in the previous section. Both units will now be ready to operate. You would have previously downloaded it from the u-blox GITHUB repository, or copied the contents of Appendix F to a .txt file.

A Wi-Fi connection is established between reference and rover boards when the rover C099-F9P is powered up. The ODIN-W2 activity LED is set blue when the base and rover have connected and flashes when data transfer is occurring. Look for acquisition activity shown in u-center to confirm the rover is operating correctly.

⚠ Ensure that any rover ZED-F9P output messages and configurations required are set before connecting the reference as this can only be done via the dedicated ZED-F9P USB connection. Ensure that the configuration is saved to flash to avoid reverting to a default operation after power cycling.

u-center will now show the rover GNSS information via the reference C099-F9P ODIN-W2 connection:

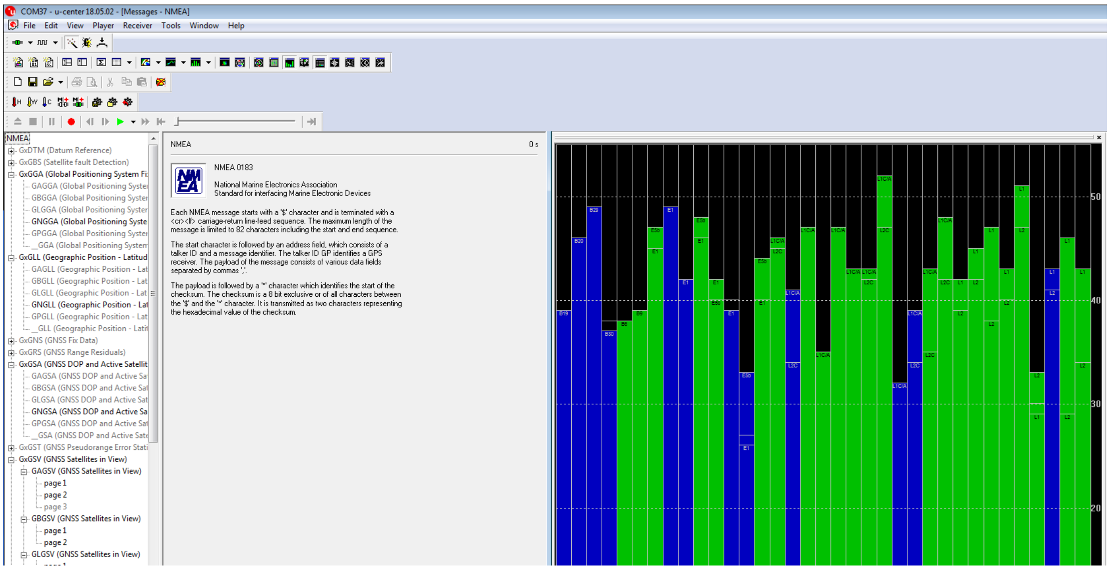


Figure 38: u-center satellite signal view

Check that the rover has obtained a RTK Fixed mode in u-center Data view:

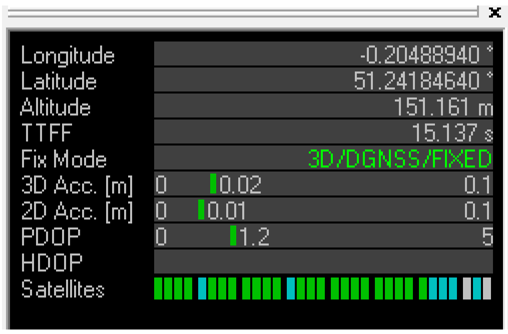


Figure 39: u-center Data view RTK FIXED indication

7 Firmware update

This section shows how to update the GNSS and Wi-Fi/Bluetooth modules' firmware if required.

The board is delivered with the latest versions of firmware running on the ZED-F9P and ODIN-W2 modules. However, newer versions may become available during the lifetime of the product.

7.1 ZED-F9P firmware update

This section shows how to update the firmware and re-enable the configuration settings required for the C099-F9P. The user has two possible serial communication channels to update ZED-F9P: UART1 and USB2.0 ports.

To update the ZED-F9P, connect to u-center via USB to the COM port identified as the ZED-F9P and poll MON-VER to view the installed firmware: see Figure 14 for the Device Manager COM port view. The shipped units will have HPG 1.12 firmware or newer. To download a new firmware follow the sequence detailed below.

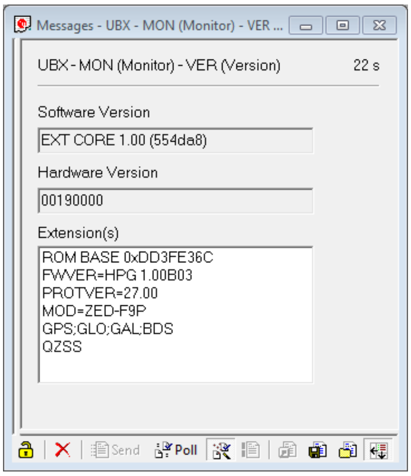


Figure 40: MON-VER poll response

To begin updating the firmware, select **Tools > Firmware Update...**

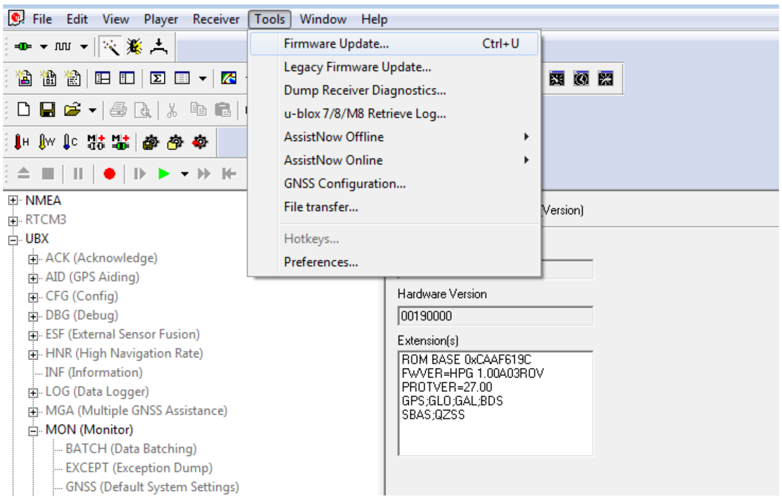


Figure 41: Selecting u-center Firmware Update mode

The following **Firmware image** update window will appear:

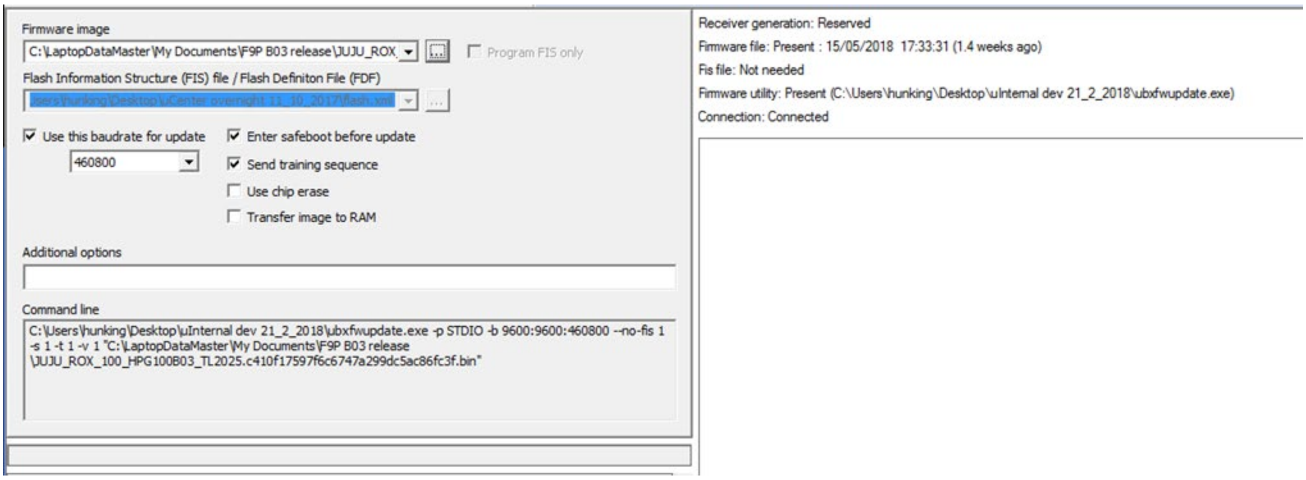


Figure 42: Selecting u-center Firmware image folder

At the top is the **Firmware image** file selection window. Click on the button to the right of the window. This allows you to select the folder and file. Select the new firmware image bin file.

Set the **Enter safeboot before update** and **Send training sequence** options. Set the **Use this baudrate for update** option and select e.g. 460800 from the pull-down list. This is shown in Figure 43 below.

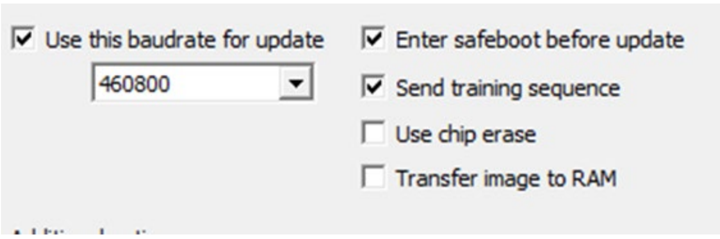


Figure 43: Setting the required baud rate, safeboot and training sequence options

Then click the **GO** button at the bottom left corner of the window to begin the download.

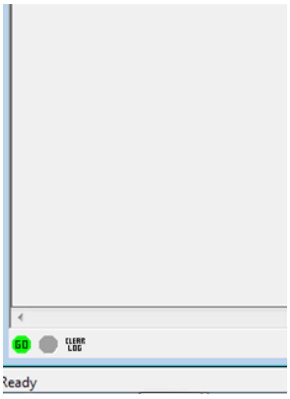


Figure 44: Click GO for firmware update

The firmware update progress indication is shown adjacent to the input window.

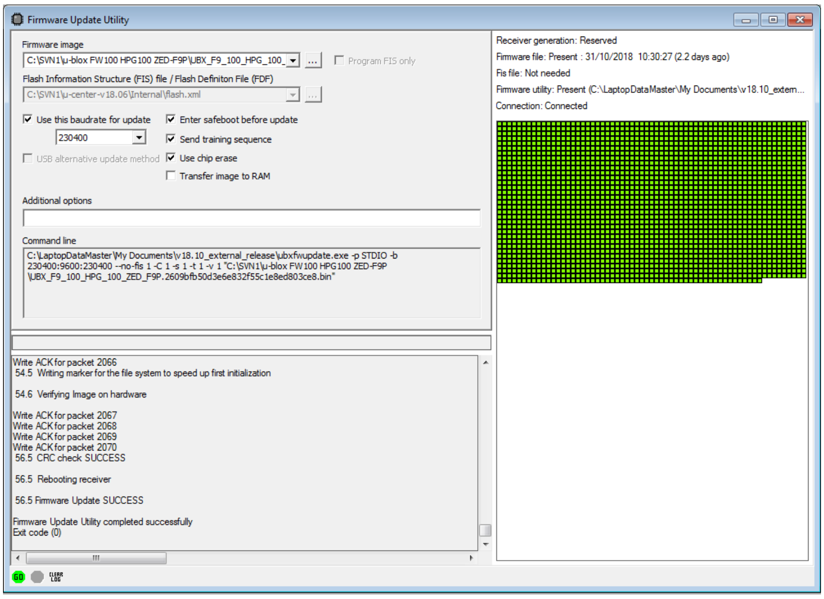


Figure 45: Programming progress and completion message

When programming is complete, the module will start up in a default configuration in which the ZED-F9P serial port is set to 38400 baud. This requires changing to 460800 baud to provide sufficient data bandwidth and work correctly with the ODIN-W2 module. In order to make the baud rate change persistent follow the instructions in the figure below.

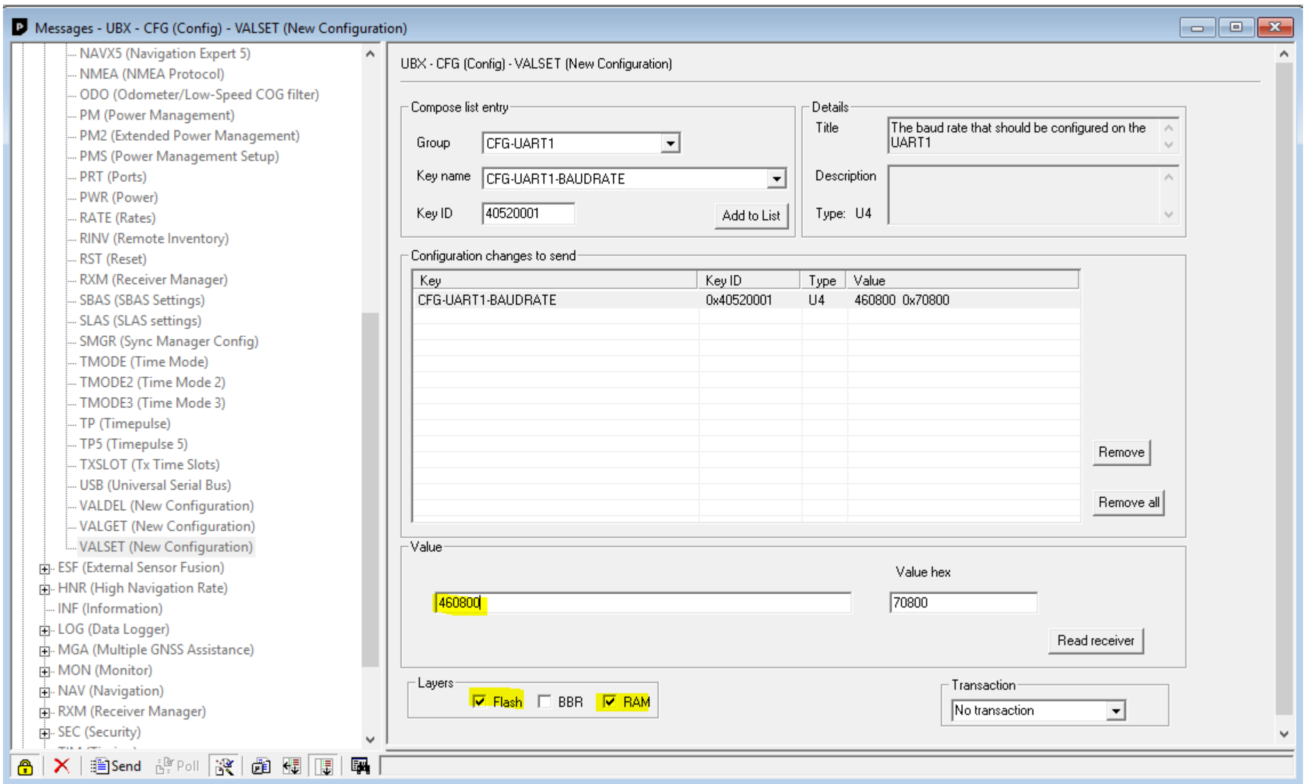


Figure 46: Setting ZED-F9P UART1 back to 460800 baud and saving it to flash memory

7.2 ODIN-W2 firmware update

Users have a choice of running two distinct firmware variants in ODIN-W2. By factory default the ODIN-W2 on a C099-F9P runs a dedicated Mbed application firmware.

7.2.1 Mbed OS 3 application firmware

The latest released binary is available via the u-blox git-hub repository:

https://github.com/u-blox/ublox-C099_F9P-mbed-3

Firmware update on ODIN-W2 is possible by the following tool set:

- Through ODIN-W2 UART1 by using stm32flash.exe

It is recommended to download the stm32flash.exe command line tool from STM website or from Sourceforge: https://sourceforge.net/projects/stm32flash/

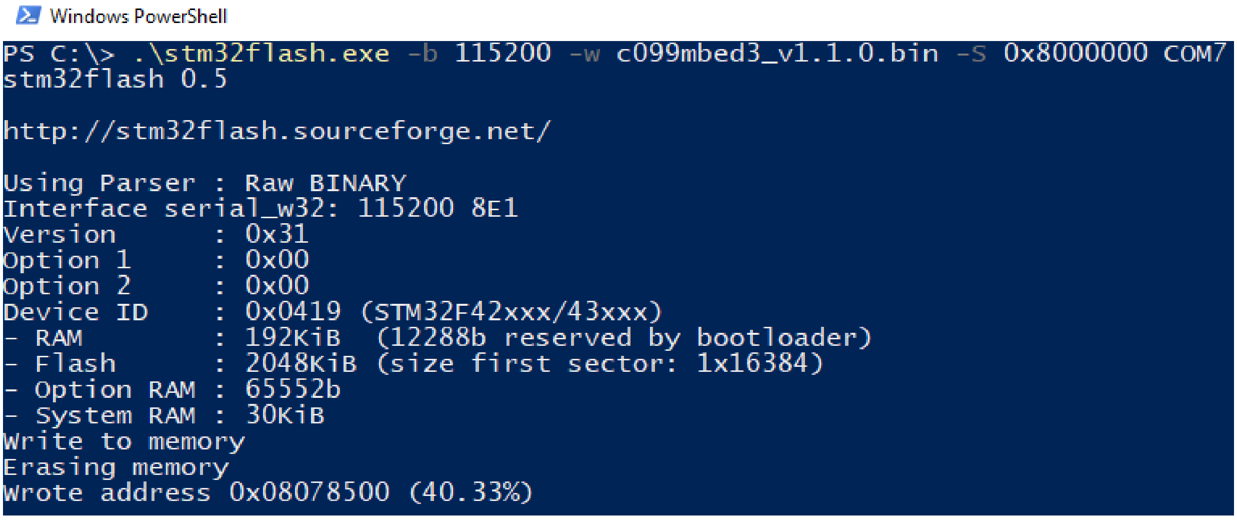
Place the downloaded stm32flash executable in the same folder with the FW binary and check for a correct ODIN-W2 COM port number in the Device Manager (Windows users).

To ensure no settings persist over the firmware versions, it is recommended to revert to factory default before uploading a new firmware.

Prior to firmware upload, the ODIN-W2 must be started in safeboot mode. Proceed by placing a safeboot jumper and reboot C099-F9P. Location of the safeboot pin header and the reset button is depicted in Figure 6. To confirm the ODIN-W2 started in safeboot mode the ODIN-W2 activity LED remains off. Use the following command structure in power shell or command prompt to start the FW upload:

```
.\stm32flash.exe -b 115200 -w <c099mbed3.bin> -S 0x8000000 COM<port number>
```

To confirm a successful FW upload remove the safeboot jumper and restart the device. The ODIN-W2 activity LED lights up.



```
Windows PowerShell
PS C:\> .\stm32flash.exe -b 115200 -w c099mbed3_v1.1.0.bin -S 0x8000000 COM7
stm32flash 0.5

http://stm32flash.sourceforge.net/

Using Parser : Raw BINARY
Interface serial_w32: 115200 8E1
Version      : 0x31
Option 1     : 0x00
Option 2     : 0x00
Device ID    : 0x0419 (STM32F42xxx/43xxx)
- RAM        : 192KiB  (12288b reserved by bootloader)
- Flash      : 2048KiB (size first sector: 1x16384)
- Option RAM : 65552b
- System RAM : 30KiB
Write to memory
Erasing memory
Wrote address 0x08078500 (40.33%)
```

Figure 47: Power shell capture of FW upload

7.2.2 u-connectXpress software

To utilize the standard ODIN-W2 connectivity stack, a firmware update is required.

The latest u-blox u-connectXpress software and related documentation is available via u-blox.com: https://www.u-blox.com/en/product/odin-w2-series

It is recommended to download the stm32flash.exe command line tool from STM website or from Sourceforge: https://sourceforge.net/projects/stm32flash/

The software upload procedure consists of two consecutive phases. First, you must upload a bootloader, but prior to the bootloader upload, you must restart the ODIN-W2 in safe boot mode.

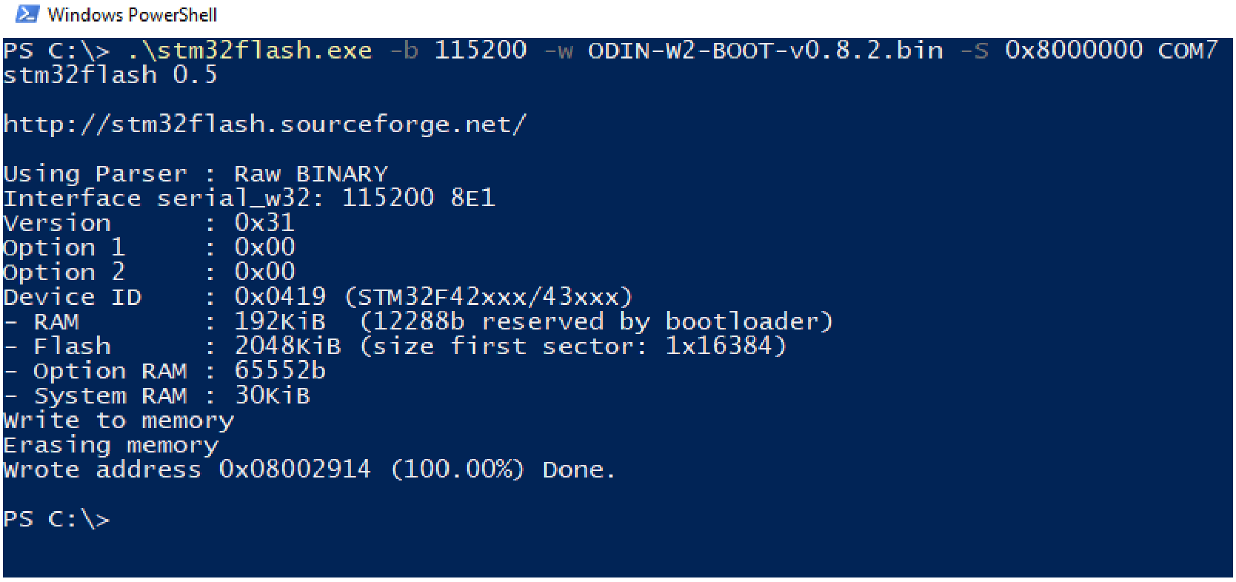
Proceed by placing a safe boot jumper and reboot the C099-F9P. The location of the safe boot pin header and the reset button is depicted in Figure 6: Switches and LEDs.

Continue with the bootloader upload:

```
.\stm32flash.exe -b 115200 -w <ODIN-W2-BOOT.bin> -S 0x8000000 COM<port number>
```

The actual connectivity software shall be uploaded while the ODIN-W2 is still in safe boot mode. Ensure correct memory indexing by incrementing the memory argument as shown below:

```
.\stm32flash.exe -b 115200 -w <ODIN-W26X-SW.bin> -S 0x8010000 COM<port number>
```



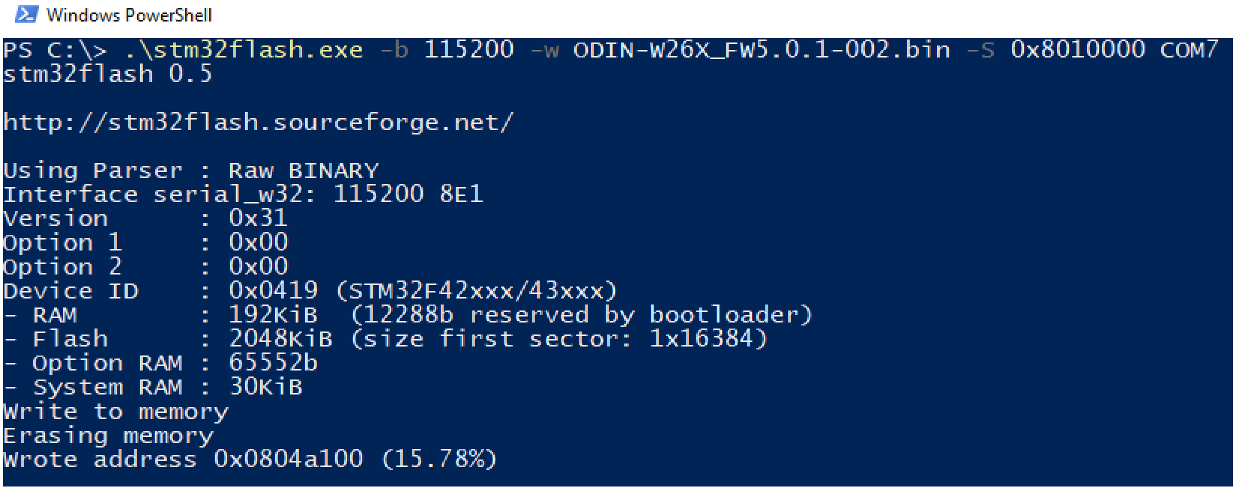
```
Windows PowerShell
PS C:\> .\stm32flash.exe -b 115200 -w ODIN-W2-BOOT-v0.8.2.bin -S 0x8000000 COM7
stm32flash 0.5

http://stm32flash.sourceforge.net/

Using Parser : Raw BINARY
Interface serial_w32: 115200 8E1
Version      : 0x31
Option 1     : 0x00
Option 2     : 0x00
Device ID    : 0x0419 (STM32F42xxx/43xxx)
- RAM        : 192KiB  (12288b reserved by bootloader)
- Flash      : 2048KiB (size first sector: 1x16384)
- Option RAM : 65552b
- System RAM : 30KiB
Write to memory
Erasing memory
Wrote address 0x08002914 (100.00%) Done.

PS C:\>
```

Figure 48: Power shell capture of bootloader upload



```
Windows PowerShell
PS C:\> .\stm32flash.exe -b 115200 -w ODIN-W26X_FW5.0.1-002.bin -S 0x8010000 COM7
stm32flash 0.5

http://stm32flash.sourceforge.net/

Using Parser : Raw BINARY
Interface serial_w32: 115200 8E1
Version      : 0x31
Option 1     : 0x00
Option 2     : 0x00
Device ID    : 0x0419 (STM32F42xxx/43xxx)
- RAM        : 192KiB  (12288b reserved by bootloader)
- Flash      : 2048KiB (size first sector: 1x16384)
- Option RAM : 65552b
- System RAM : 30KiB
Write to memory
Erasing memory
Wrote address 0x0804a100 (15.78%)
```

Figure 49: Power shell capture of connectivity software upload

Once the connectivity software is uploaded successfully, the ODIN-W2 will be set with a baud rate of 115200 baud with hardware flow control enabled. You must change this to no hardware flow control and set the ODIN-W2 UART baud rate to 460800 to ensure sufficient link bandwidth.

To proceed, restart the ODIN-W2 in a normal boot mode by removing the safeboot jumper and pressing the RESET button.

- Set s-center to 115200 baud and no flow control.
- Open the COM port.

Select **EVK-ODIN-W2 via ST-LINK** button to disable flow control as shown in Figure 30.

Navigate to "User Defines" AT command tab, as shown in Figure 50.

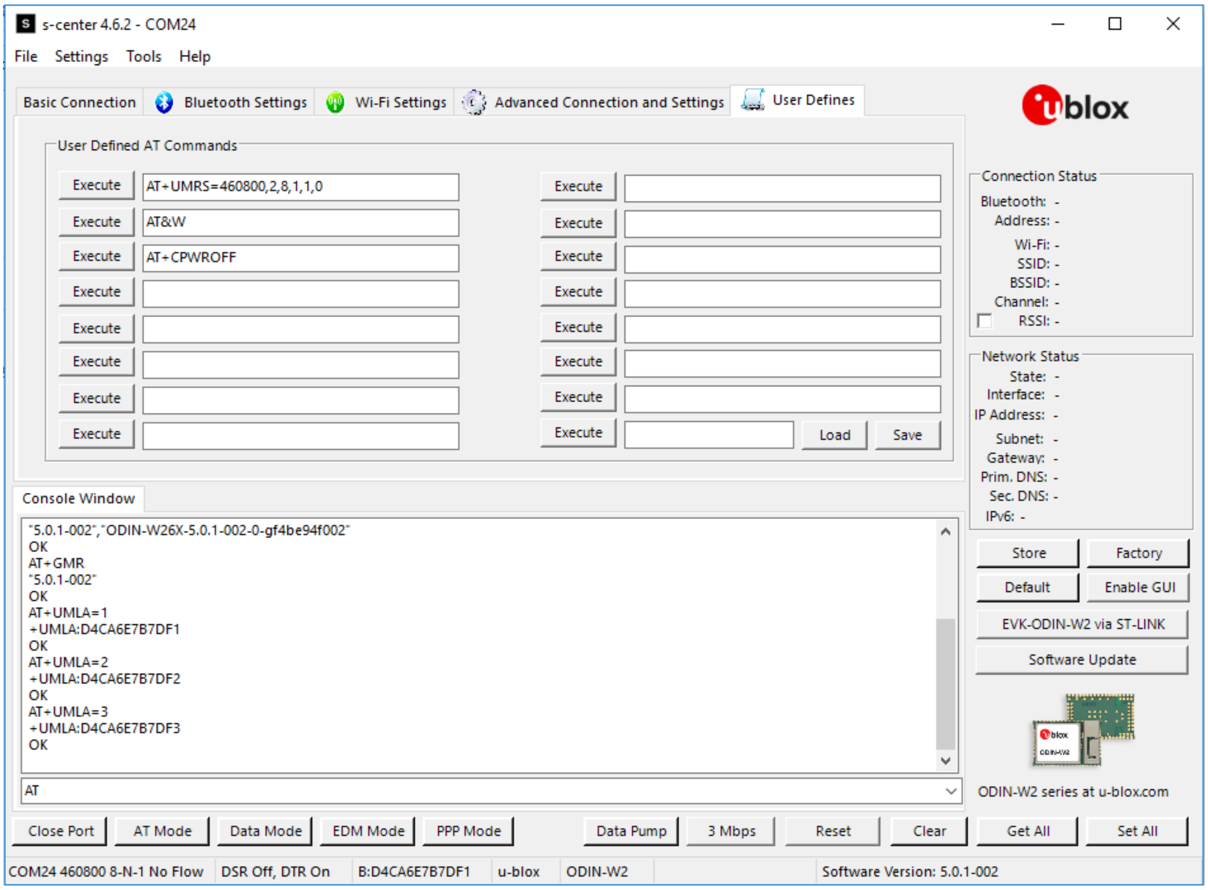


Figure 50: Set baud rate

Execute the following command set sequentially:

- AT+UMRS=460800,2,8,1,1,0
- AT&W
- AT+CPWROFF

Finally, adjust s-center baud rate to match 460800 by closing and opening the UART port.

Click the **AT Mode** button to ensure it is responding correctly. You will see it respond with AT commands if communication is OK.

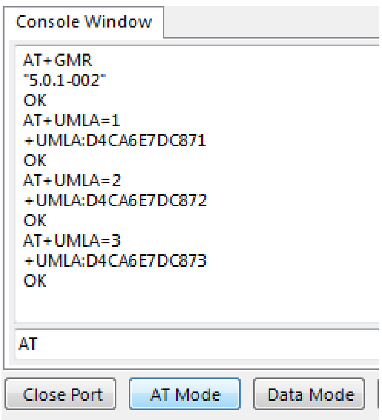


Figure 51: Clicking AT Mode button

Download a u-blox configuration file for the ODIN-W2 module. The “u-blox ODIN-W2 BT Rover.txt” file is the default configuration file shipped with the C099-F9P. See Appendix C for configuration file resources.

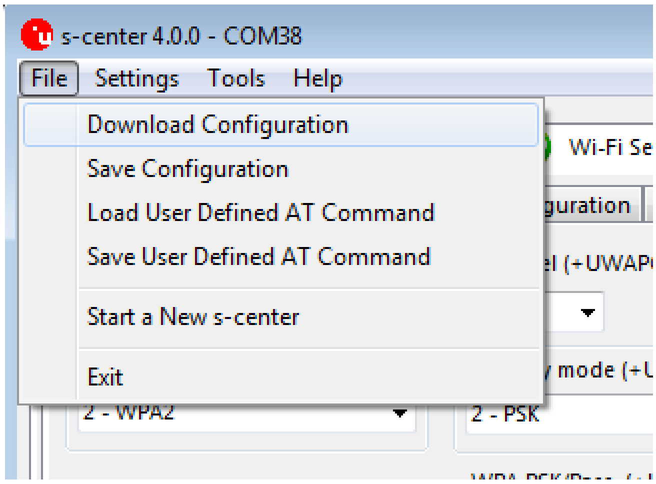


Figure 52: Selecting File > Download Configuration

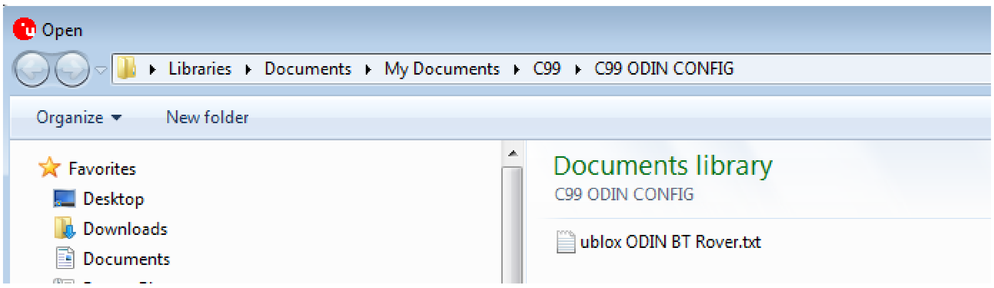


Figure 53: Selecting “u-blox ODIN-W2 BT Rover.txt” file

Select the file and click **Open**. It will download the file and write it to flash.

☞ The ODIN-W2 UART will now be set to 460800 baud in Data default mode. It will be ready for use again.

Disconnect s-center from the ODIN-W2 port and power the C099-F9P off and on to ensure it will be using the new configurations as default.

Position a jumper at “OE3” for Bluetooth operation.

The rover is now ready to connect to PC or Mobile via Bluetooth SPP.

The board is now ready to use for the wireless connection examples described in the earlier sections.

When untethered operation is not required, the ZED-F9P dedicated USB connection on the C099-F9P can be used for supplying corrections and monitoring or logging purposes with u-center.

8 Arduino header connections

The board size and four connectors comply with the Arduino R3/Uno mechanical specification. The functions of each I/O align as much as possible to the Arduino-specified functions. Check the pin functions before using with an Arduino R3/Uno; see Figure 55 below. All the pin functions besides power are 3.3 V compliant.

Figure 54: C099-F9P Arduino connectors

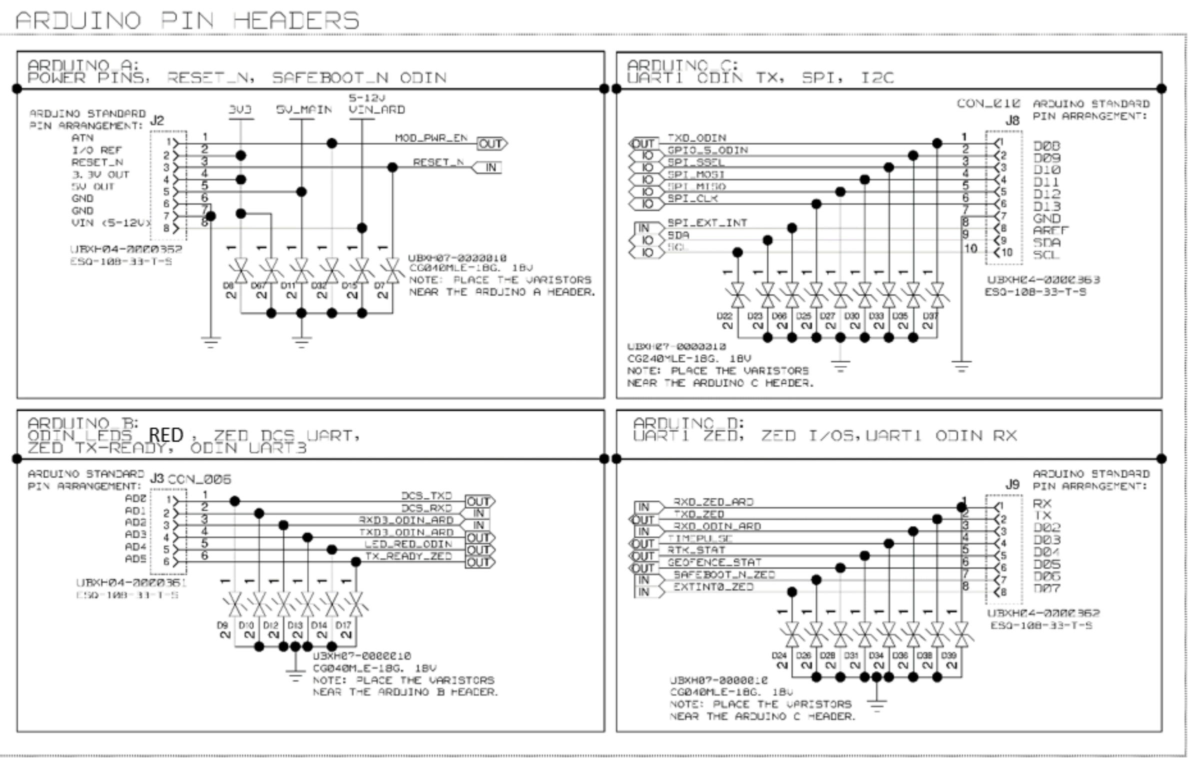


Figure 55 C099-F9P Arduino R3 connections

Appendix

A Glossary

Abbreviation	Definition
FW	Firmware
Li-Po	Lithium polymer
NTRIP	Networked transport of RTCM via internet protocol
RTK	Real time kinematic
UART	Universal asynchronous receiver transmitter
USB	Universal serial bus
UTC	Coordinated universal time
VCP	Virtual COM port

Table 2: Explanation of the abbreviations and terms used

B Resources

Applicable configuration files are available in u-blox Github:

https://github.com/u-blox/ublox-C099_F9P-uCS

C u-blox ODIN-W2 BT Rover.txt

Copy all the text below this line into a text file named “u-blox ODIN-W2 BT Rover.txt”.

```
AT+UBTLN="ODIN-W2-xxxx"
AT+UBTLC=000000
AT+UBTCM=2
AT+UBTDM=3
AT+UBTPM=2
AT+UBTMSP=1
AT+UBTLE=0
AT+UBTSM=1
AT+UNHN="ODIN-W2-20003600155137333393539"
AT+UDDRP=0,"",0
AT+UDDRP=1,"",0
AT+UDDRP=2,"",0
AT+UDDRP=3,"",0
AT+UDDRP=4,"",0
AT+UDDRP=5,"",0
AT+UDDRP=6,"",0
AT+UWSCA=0,4
AT+UWSC=0,0,0
AT+UWAPC=0,4
AT+UWAPC=0,0,0
AT+UWAPC=0,2,""
AT+UWAPC=0,4,1
AT+UWAPC=0,5,2,2
AT+UWAPC=0,100,1
AT+UWAPC=0,106,1
AT+UWSC=0,0,0
ATS2=43
ATS3=13
ATS4=10
ATS5=8
AT+UDCFG=0,1
AT&S1
AT&D0
```

```
ATE1
AT+UBTCFG=1,1
AT+UBTCFG=2,1
AT+UBTCFG=3,56602
AT+UBTCFG=4,127
AT+UBTCFG=5,0
AT+UBTCFG=6,0
AT+UBTCFG=7,2000
AT+UBTCFG=8,0
AT+UBTCFG=9,0
AT+UBTLECFG=1,1600
AT+UBTLECFG=2,2000
AT+UBTLECFG=3,7
AT+UBTLECFG=4,24
AT+UBTLECFG=5,40
AT+UBTLECFG=6,0
AT+UBTLECFG=7,2000
AT+UBTLECFG=8,5000
AT+UBTLECFG=9,48
AT+UBTLECFG=10,48
AT+UBTLECFG=11,24
AT+UBTLECFG=12,40
AT+UBTLECFG=13,0
AT+UBTLECFG=14,2000
AT+UBTLECFG=15,5000
AT+UBTLECFG=16,48
AT+UBTLECFG=17,48
AT+UBTLECFG=18,24
AT+UBTLECFG=19,40
AT+UBTLECFG=20,0
AT+UBTLECFG=21,2000
AT+UBTLECFG=22,5000
AT+UBTLECFG=23,48
AT+UBTLECFG=24,48
AT+UBTLECFG=25,0
AT+UMSM=1
AT+UMRS=460800,2,8,1,1,1
AT&W
AT+CPWROFF
```

D Rover ODIN-W2 Access Point UDP Server.txt

Copy all the text below this line into a text file named “Rover ODIN-W2 Access Point UDP Server .txt”.

```
AT+UWAPCA=0,4
AT+UWAPC=0,0,1
AT+UWAPC=0,2,UBXWifi
AT+UWAPC=0,4,1
AT+UWAPC=0,5,1,1
AT+UWAPC=0,100,1
AT+UWAPC=0,101,192.168.0.10
AT+UWAPC=0,102,255.255.0.0
AT+UWAPC=0,103,192.168.0.1
AT+UWAPC=0,104,0.0.0.0
AT+UWAPC=0,105,0.0.0.0
AT+UWAPC=0,106,1
AT+UWAPCA=0,1
AT+UWAPCA=0,3
AT+UWCFG=1,0
AT+UDSC=1,2,5003,1
AT+UMSM=1
AT+UMRS=460800,2,8,1,1,0
AT&D0
AT&W
AT+CPWROFF
```

E Reference station ODIN-W2 UDP client.txt

Copy all the text below this line into a text file named “Base ODIN-W2 Station UDP client.txt”.

```
AT+UWSCA=0,4
AT+UWSC=0,0,1
AT+UWSC=0,2,"UBXWifi"
AT+UWSC=0,5,1
AT+UWSC=0,100,2
AT+UWSCA=0,1
AT+UWSCA=0,3
AT+UWCFG=1,0
AT+UMSM=1
AT+UDDRP=0,"udp://192.168.0.10:5003",2
AT+UMRS=460800,2,8,1,1,0
AT&D0
AT&W
AT+CPWROFF
```

F F9P Base config C99.txt

Copy all the text below this line into a text file named “F9P Base config C99.txt.

```
# Config changes format version 1.0
# created by u-center version 18.11 at 11:37:53 on Tuesday, 08 Jan 2019
[del]
[set]
  RAM CFG-UART1INPROT-NMEA 0        # write value 0                 to item id 10730002
Flash CFG-UART1INPROT-NMEA 0        # write value 0                 to item id 10730002
  RAM CFG-UART1INPROT-RTCM3X 0      # write value 0                 to item id 10730004
Flash CFG-UART1INPROT-RTCM3X 0      # write value 0                 to item id 10730004
  RAM CFG-UART1OUTPROT-UBX 0        # write value 0                 to item id 10740001
Flash CFG-UART1OUTPROT-UBX 0        # write value 0                 to item id 10740001
  RAM CFG-UART1OUTPROT-NMEA 0       # write value 0                 to item id 10740002
Flash CFG-UART1OUTPROT-NMEA 0       # write value 0                 to item id 10740002
  RAM CFG-UART1OUTPROT-RTCM3X 1     # write value 1                 to item id 10740004
Flash CFG-UART1OUTPROT-RTCM3X 1     # write value 1                 to item id 10740004
Flash CFG-UART1INPROT-UBX   0       # write value 0                 to item id 10730001
  RAM CFG-UART1INPROT-UBX   0       # write value 0                 to item id 10730001
  RAM CFG-MSGOUT-RTCM_3X_TYPE1005_UART1 0x1  # write value 1  0x1   to item id 209102be
Flash CFG-MSGOUT-RTCM_3X_TYPE1005_UART1 0x1  # write value 1  0x1   to item id 209102be
  RAM CFG-MSGOUT-RTCM_3X_TYPE1074_UART1 0x1  # write value 1  0x1   to item id 2091035f
Flash CFG-MSGOUT-RTCM_3X_TYPE1074_UART1 0x1  # write value 1  0x1   to item id 2091035f
  RAM CFG-MSGOUT-RTCM_3X_TYPE1084_UART1 0x1  # write value 1  0x1   to item id 20910364
Flash CFG-MSGOUT-RTCM_3X_TYPE1084_UART1 0x1  # write value 1  0x1   to item id 20910364
  RAM CFG-MSGOUT-RTCM_3X_TYPE1124_UART1 0x1  # write value 1  0x1   to item id 2091036e
Flash CFG-MSGOUT-RTCM_3X_TYPE1124_UART1 0x1  # write value 1  0x1   to item id 2091036e
  RAM CFG-MSGOUT-RTCM_3X_TYPE1230_UART1 0x5  # write value 5  0x5   to item id 20910304
Flash CFG-MSGOUT-RTCM_3X_TYPE1230_UART1 0x5  # write value 5  0x5   to item id 20910304
  RAM CFG-MSGOUT-RTCM_3X_TYPE1005_USB 0x1    # write value 1  0x1   to item id 209102c0
Flash CFG-MSGOUT-RTCM_3X_TYPE1005_USB 0x1    # write value 1  0x1   to item id 209102c0
  RAM CFG-MSGOUT-RTCM_3X_TYPE1074_USB 0x1    # write value 1  0x1   to item id 20910361
Flash CFG-MSGOUT-RTCM_3X_TYPE1074_USB 0x1    # write value 1  0x1   to item id 20910361
  RAM CFG-MSGOUT-RTCM_3X_TYPE1084_USB 0x1    # write value 1  0x1   to item id 20910366
Flash CFG-MSGOUT-RTCM_3X_TYPE1084_USB 0x1    # write value 1  0x1   to item id 20910366
  RAM CFG-MSGOUT-RTCM_3X_TYPE1124_USB 0x1    # write value 1  0x1   to item id 20910370
Flash CFG-MSGOUT-RTCM_3X_TYPE1124_USB 0x1    # write value 1  0x1   to item id 20910370
  RAM CFG-MSGOUT-RTCM_3X_TYPE1230_USB 0x5    # write value 5  0x5   to item id 20910306
Flash CFG-MSGOUT-RTCM_3X_TYPE1230_USB 0x5    # write value 5  0x5   to item id 20910306
RAM CFG-MSGOUT-RTCM_3X_TYPE1094_UART1 0x1    # write value 1  0x1   to item id 20910369
Flash CFG-MSGOUT-RTCM_3X_TYPE1094_UART1 0x1  # write value 1  0x1   to item id 20910369
  RAM CFG-MSGOUT-RTCM_3X_TYPE1094_USB 0x1    # write value 1  0x1   to item id 2091036b
Flash CFG-MSGOUT-RTCM_3X_TYPE1094_USB 0x1    # write value 1  0x1   to item id 2091036b
  RAM CFG-MSGOUT-UBX_NAV_PVT_USB 0x1         # write value 1  0x1    to item id 20910009
Flash CFG-MSGOUT-UBX_NAV_PVT_USB 0x1         # write value 1  0x1    to item id 20910009
  RAM CFG-MSGOUT-UBX_NAV_SVIN_USB 0x1        # write value 1  0x1    to item id 2091008b
Flash CFG-MSGOUT-UBX_NAV_SVIN_USB 0x1        # write value 1  0x1    to item id 2091008b
Flash CFG-UART1-BAUDRATE   0x70800     # write value 460800  0x70800 to item id 40520001
  RAM CFG-UART1-BAUDRATE   0x70800     # write value 460800  0x70800 to item id 40520001
```

G F9P Rover config C99.txt

Copy all the text below this line into a text file named “F9P Rover config C99.txt.

```
# Config changes format version 1.0
# created by u-center version 18.11 at 11:16:51 on Tuesday, 27 Nov 2018
[del]
[set]
  RAM CFG-UART1INPROT-UBX   1        # write value 1                  to item id 10730001
Flash CFG-UART1INPROT-UBX   1        # write value 1                  to item id 10730001
  RAM CFG-UART1INPROT-NMEA  0        # write value 0                  to item id 10730002
Flash CFG-UART1INPROT-NMEA  0        # write value 0                  to item id 10730002
  RAM CFG-UART1INPROT-RTCM3X 1       # write value 1                  to item id 10730004
Flash CFG-UART1INPROT-RTCM3X 1       # write value 1                  to item id 10730004
  RAM CFG-UART1OUTPROT-UBX 1         # write value 1                  to item id 10740001
Flash CFG-UART1OUTPROT-UBX 1         # write value 1                  to item id 10740001
  RAM CFG-UART1OUTPROT-NMEA 1        # write value 1                  to item id 10740002
Flash CFG-UART1OUTPROT-NMEA 1        # write value 1                  to item id 10740002
  RAM CFG-UART1OUTPROT-RTCM3X 0      # write value 0                  to item id 10740004
Flash CFG-UART1OUTPROT-RTCM3X 0      # write value 0                  to item id 10740004
  RAM CFG-USBINPROT-UBX     1        # write value 1                  to item id 10770001
Flash CFG-USBINPROT-UBX     1        # write value 1                  to item id 10770001
  RAM CFG-USBINPROT-NMEA    1        # write value 1                  to item id 10770002
Flash CFG-USBINPROT-NMEA    1        # write value 1                  to item id 10770002
  RAM CFG-USBINPROT-RTCM3X 1         # write value 1                  to item id 10770004
Flash CFG-USBINPROT-RTCM3X 1         # write value 1                  to item id 10770004
  RAM CFG-USBOUTPROT-UBX    1        # write value 1                  to item id 10780001
Flash CFG-USBOUTPROT-UBX    1        # write value 1                  to item id 10780001
Flash CFG-USBOUTPROT-NMEA   1        # write value 1                  to item id 10780002
  RAM CFG-USBOUTPROT-RTCM3X 0        # write value 0                  to item id 10780004
Flash CFG-USBOUTPROT-RTCM3X 0        # write value 0                  to item id 10780004
Flash CFG-UART1-BAUDRATE    0x70800  # write value 460800   0x70800   to item id 40520001
  RAM CFG-UART1-BAUDRATE    0x70800  # write value 460800   0x70800   to item id 40520001
```

H C099-F9P antenna specification

H.1 Wi-Fi/Bluetooth antenna specification

EX-IT WLAN RPSMA / Ex-IT WLAN SMA	
Manufacturer	ProAnt
Type	½ wave dipole dual-band antenna
Polarization	Vertical
Gain	+3 dBi
Impedance	50 Ω
Size	107 mm (straight)
Type	Monopole
Connector	Reverse polarity SMA plug (inner thread and pin receptacle) SMA plug (inner thread and pin)
Comment	To be mounted on the U.FL to SMA or reverse polarity SMA adapter cable
Approval	FCC, IC, RED, MIC, NCC, KCC*, ANATEL, and ICASA

Table 3: Wi-Fi/Bluetooth antenna

☞ The variant included in the C099-F9P kit is with SMA connector and has to be mounted on the corresponding antenna connector of the C099-F9P board if you wish to use Wi-Fi or Bluetooth connectivity.

I Mechanical board dimensions

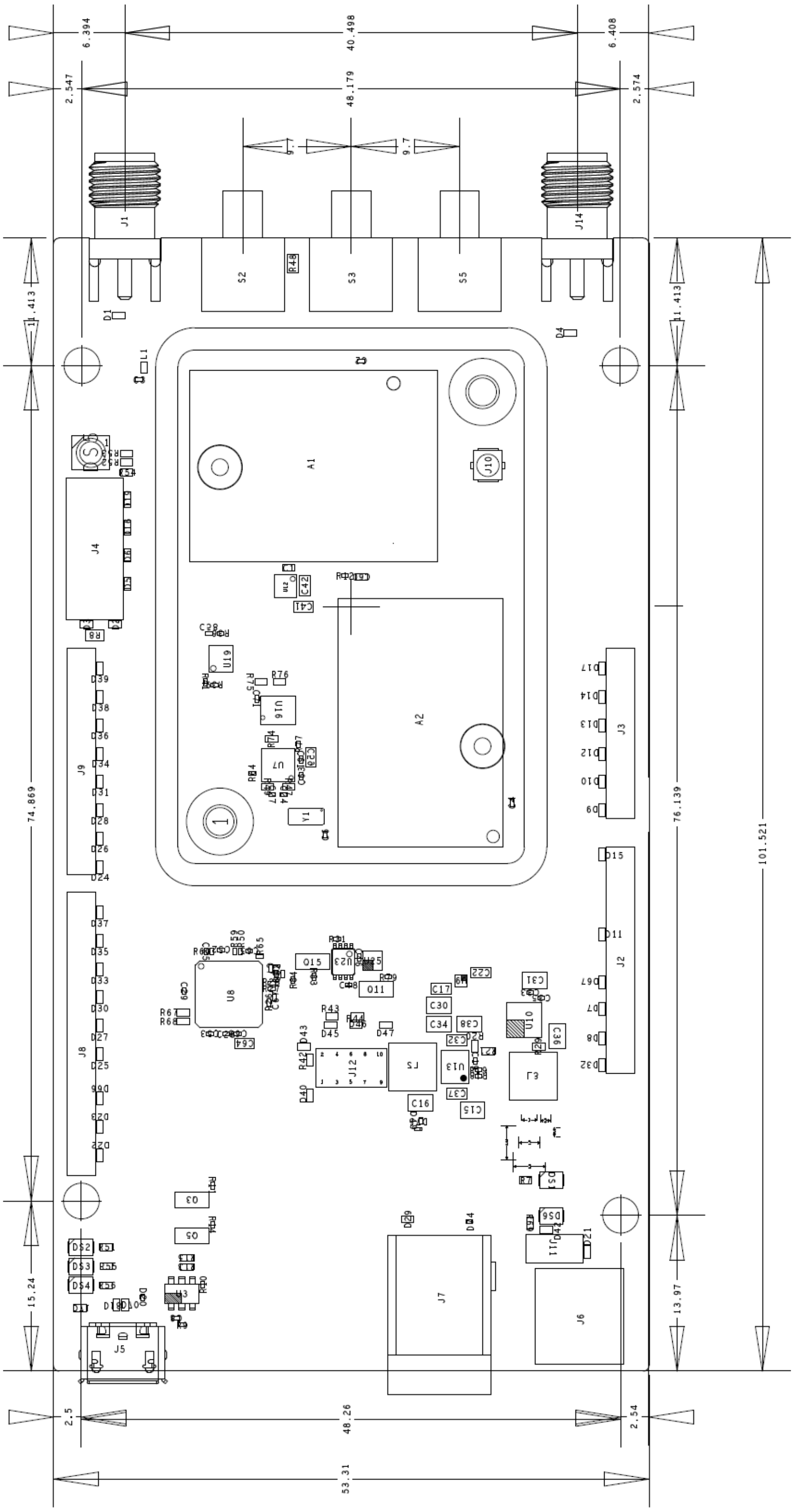
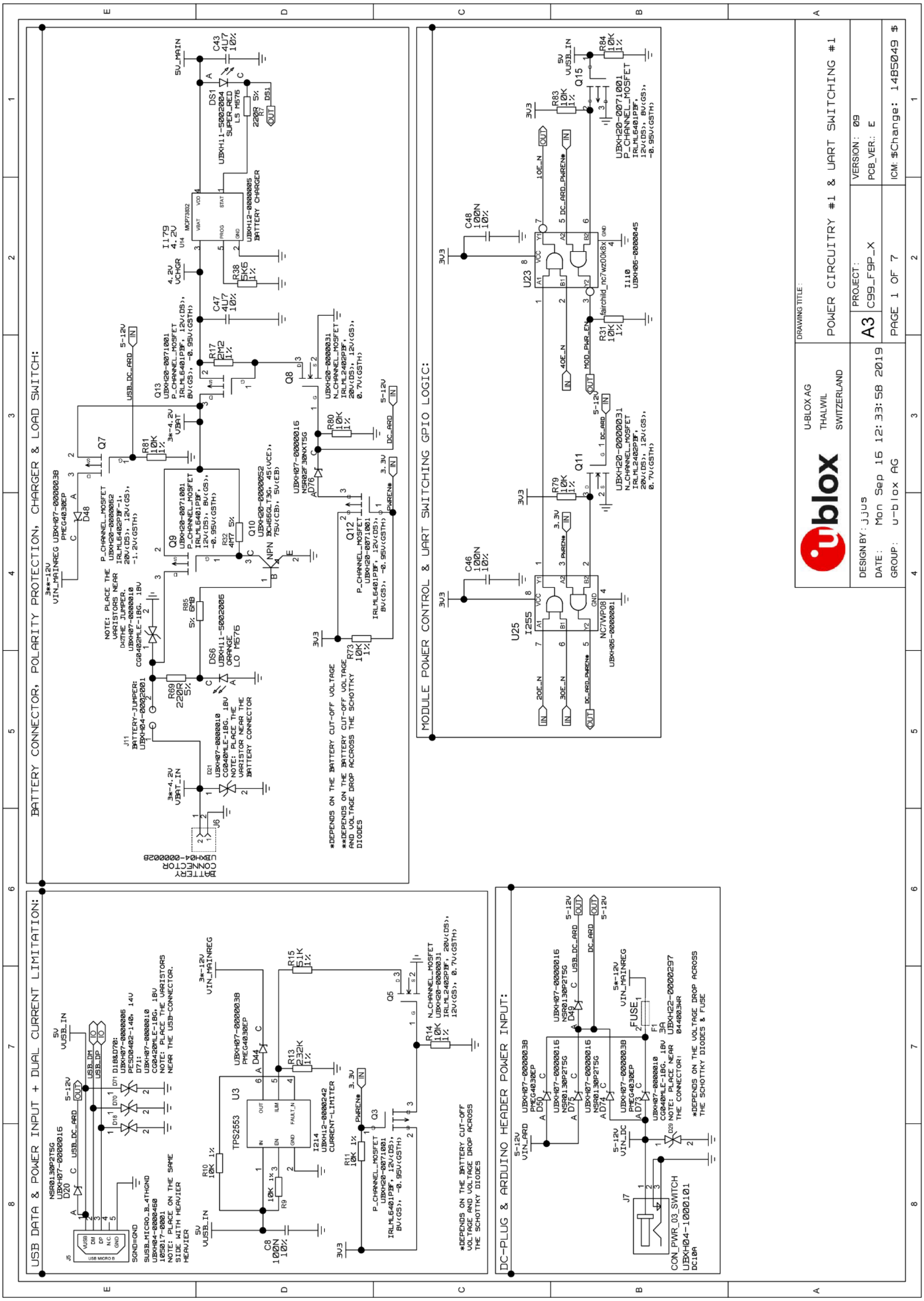
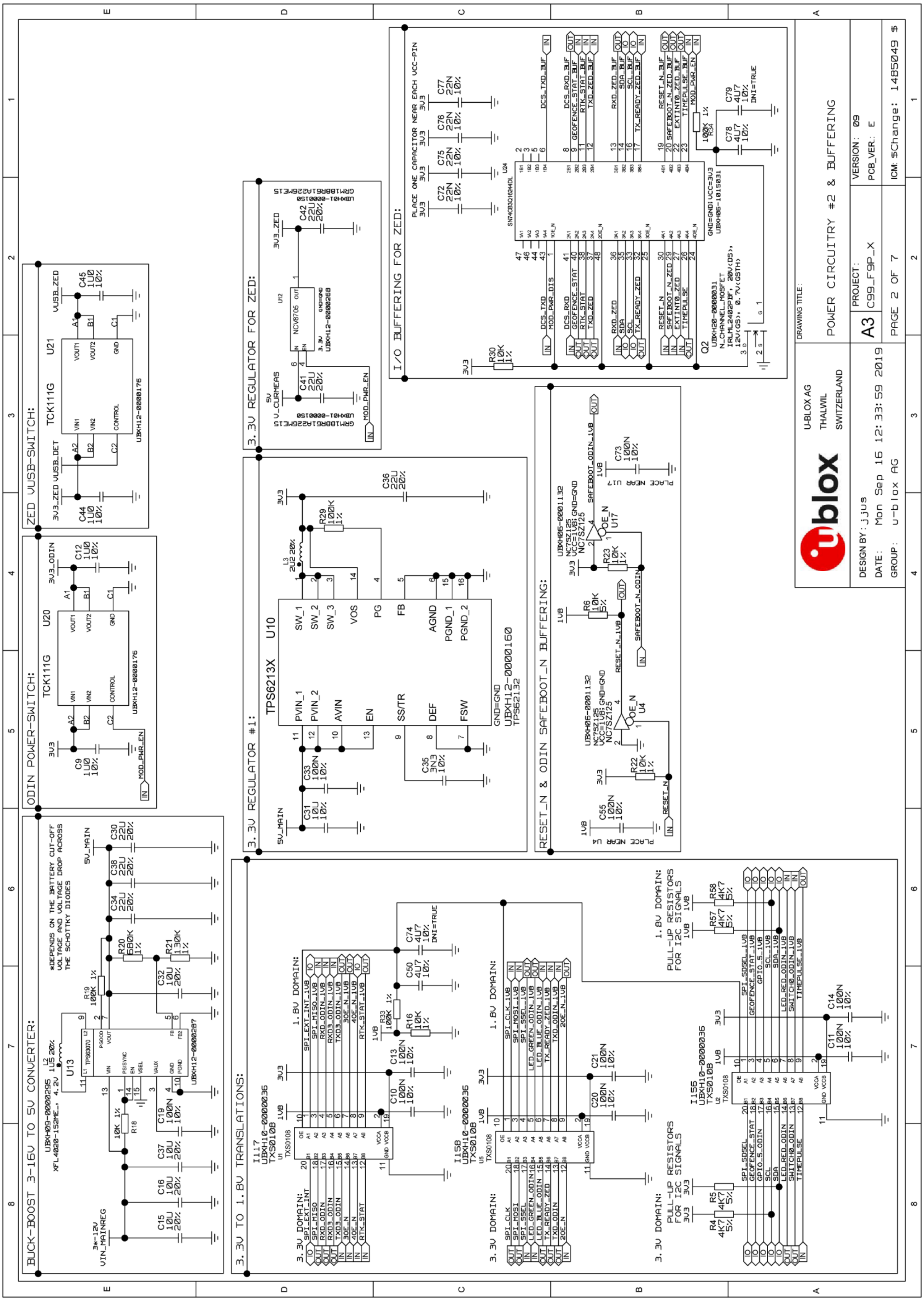


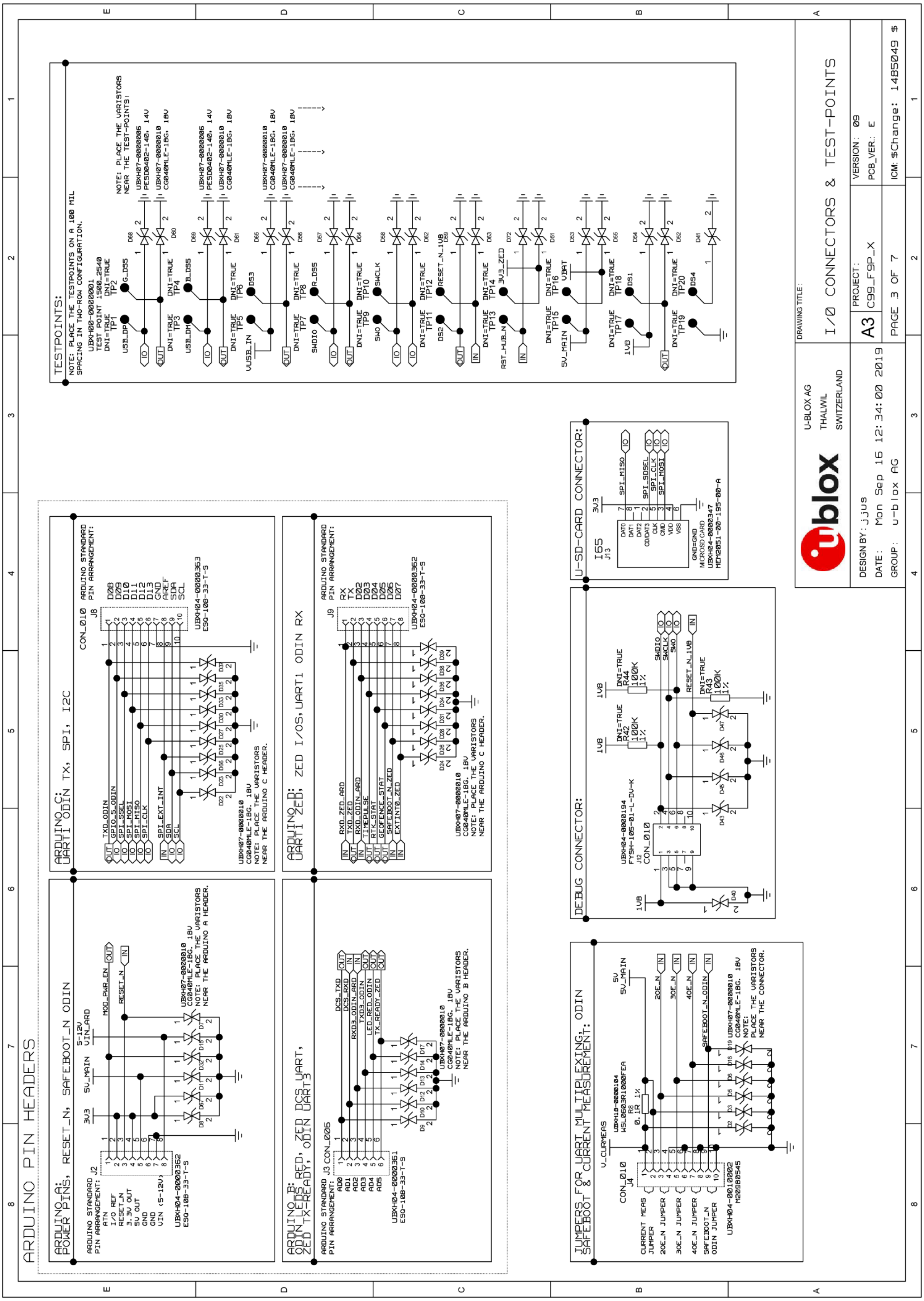
Figure 56: C099-F9P rev. E dimensions

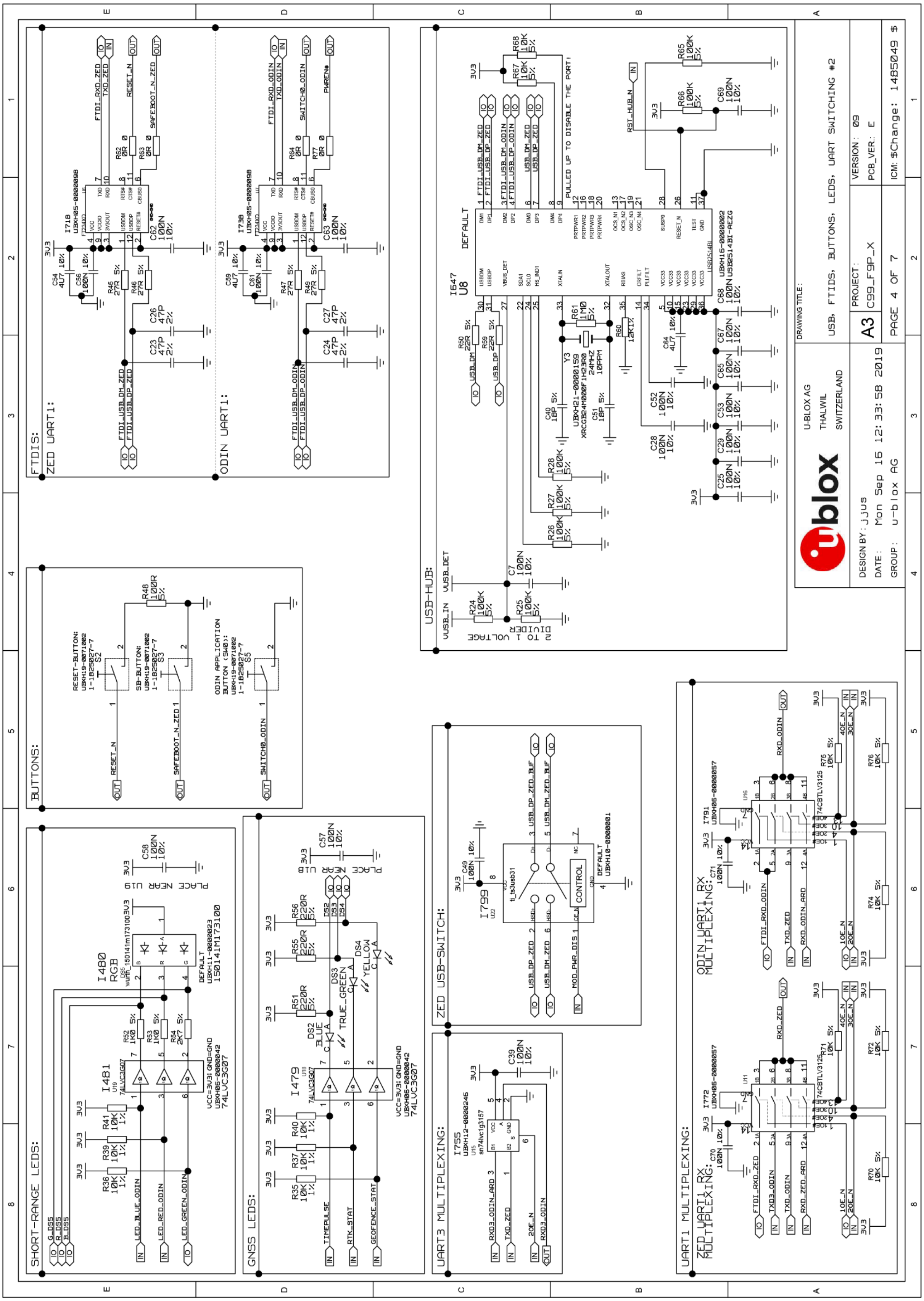
J C099-F9P schematics

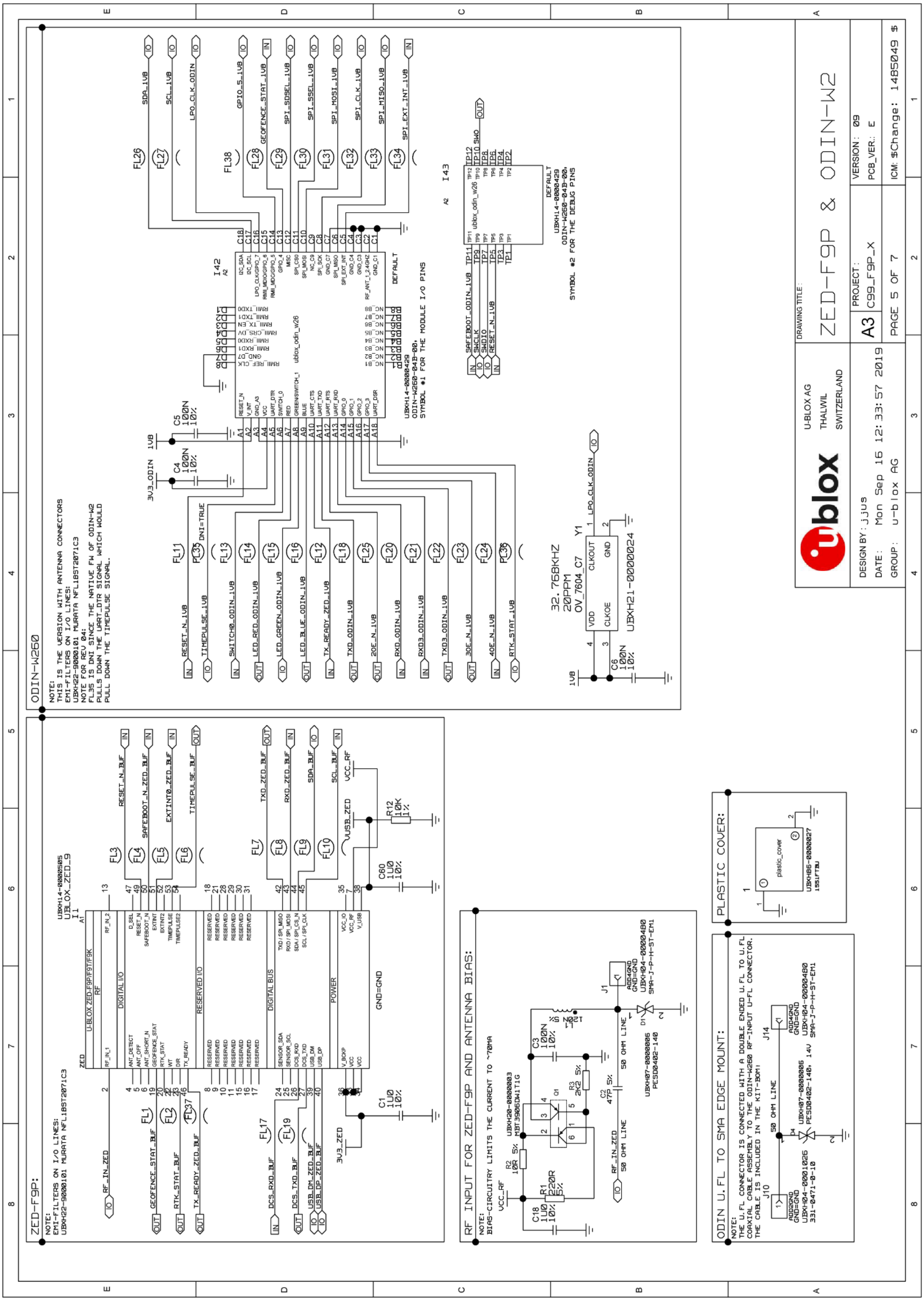
The following pages show the complete schematic for the C099-F9P evaluation board.


BATTERY CONNECTOR, POLARITY PROTECTION, CHARGER & LOAD SWITCH:
MODULE POWER CONTROL & UART SWITCHING GPIO LOGIC:
USB DATA & POWER INPUT + DUAL CURRENT LIMITATION:
DC-PLUG & ARDUINO HEADER POWER INPUT:
DRAWING TITLE:
POWER CIRCUITRY #1 & UART SWITCHING #1
U-BLOX AG
THALWIL
SWITZERLAND
DESIGN BY: jjus
DATE: Mon Sep 16 12:33:58 2019
GROUP: u-blox AG
A3
PROJECT: C99_F9P_X
PAGE 1 OF 7
VERSION: 09
PCB_VER.: E
ICM: $Change: 1485049 $


BUCK-BOOST 3-16V TO 5V CONVERTER:
ODIN POWER-SWITCH:
ZED VUSB-SWITCH:
3.3V REGULATOR #1:
3.3V REGULATOR FOR ZED:
I/O BUFFERING FOR ZED:
RESET_N & ODIN SAFEBOOT_N BUFFERING:
3.3V TO 1.8V TRANSLATIONS:
DRAWING TITLE:
POWER CIRCUITRY #2 & BUFFERING
A3
PROJECT: C99_F9P_X
PAGE 2 OF 7
VERSION: 09
PCB_VER.: E
ICM: $Change: 1485049 $
U-BLOX AG
THALWIL
SWITZERLAND
DESIGN BY: jjus
DATE: Mon Sep 16 12:33:59 2019
GROUP: u-blox AG


ARDUINO PIN HEADERS
TESTPOINTS:
ARDUINO A: POWER PINS, RESET_N, SAFEBOOT_N ODIN
ARDUINO B: ODIN LEDS RED, ZED DCS UART, ZED TX-READY, ODIN UART3
ARDUINO C: UART1 ODIN TX, SPI, I2C
ARDUINO D: UART1 ZED, ZED I/OS, UART1 ODIN RX
U-SD-CARD CONNECTOR:
DEBUG CONNECTOR:
JUMPERS FOR UART MULTIPLEXING, SAFEBOOT & CURRENT MEASUREMENT: ODIN
I/O CONNECTORS & TEST-POINTS
U-BLOX AG
THALWIL
SWITZERLAND
A3
PROJECT: C99_F9P_X
VERSION: 09
PCB_VER.: E
PAGE 3 OF 7
DESIGN BY: jjus
DATE: Mon Sep 16 12:34:00 2019
GROUP: u-blox AG


FTDIS:
ZED UART1:
ODIN UART1:
USB-HUB:
BUTTONS:
SHORT-RANGE LEDS:
GNSS LEDS:
UART3 MULTIPLEXING:
ZED USB-SWITCH:
UART1 MULTIPLEXING:
DRAWING TITLE:
USB, FTDIS, BUTTONS, LEDS, UART SWITCHING #2
U-BLOX AG
THALWIL
SWITZERLAND
A3
PROJECT: C99_F9P_X
VERSION: 09
PCB_VER.: E
PAGE 4 OF 7
DESIGN BY: jjus
DATE: Mon Sep 16 12:33:58 2019
GROUP: u-blox AG
ICM: $Change: 1485049 $


ZED-F9P & ODIN-W2
U-BLOX AG
THALWIL
SWITZERLAND
DESIGN BY : jjus
DATE : Mon Sep 16 12:33:57 2019
GROUP : u-blox AG
A3
PROJECT : C99_F9P_X
PAGE 5 OF 7
VERSION : 09
PCB_VER.: E
ICM: $Change: 1485049 $
ODIN-W260
NOTE:
THIS IS THE VERSION WITH ANTENNA CONNECTORS
EMI-FILTERS ON I/O LINES:
UBXH22-9000101 MURATA NFL18ST2071C3
NOTE FOR REV 04:
FL35 IS DNI SINCE THE NATIVE FW OF ODIN-W2
PULLS DOWN THE UART_DTR SIGNAL WHICH WOULD
PULL DOWN THE TIMEPULSE SIGNAL.
ZED-F9P:
NOTE:
EMI-FILTERS ON I/O LINES:
UBXH22-9000101 MURATA NFL18ST2071C3
RF INPUT FOR ZED-F9P AND ANTENNA BIAS:
NOTE:
BIAS-CIRCUITRY LIMITS THE CURRENT TO ~70MA
ODIN U.FL TO SMA EDGE MOUNT:
NOTE:
THE U.FL CONNECTOR IS CONNECTED WITH A DOUBLE ENDED U.FL TO U.FL
COAXIAL CABLE ASSEMBLY TO THE ODIN-W260 RF-INPUT U.FL CONNECTOR.
THE CABLE IS INCLUDED IN THE KIT-BOM!
PLASTIC COVER:
UBXH14-0000429
ODIN-W260-04B-00,
SYMBOL #1 FOR THE MODULE I/O PINS
SYMBOL #2 FOR THE DEBUG PINS
32.768KHZ
20PPM
OV_7604_C7
UBXH21-0000024
UBXH14-0000505
UBLOX_ZED_9
UBXH20-0000003
MBT3906DW1T1G
UBXH07-0000006
PESD0402-140
UBXH04-0000480
SMA-J-P-H-ST-EM1
UBXH04-0001026
331-0471-0-10
UBXH86-0000027
50 OHM LINE

Related documents

[1] ZED-F9P Interface description, doc. no. UBX-18010854
[2] ZED-F9P Integration manual, doc no. UBX-18010802
[3] u-center User guide, doc. no. UBX-13005250
[4] u-blox GNSS Sensor and VCP Device Driver User guide, doc. no. UBX-15022397
[5] u-blox Short Range Modules AT Commands Manual, doc no. UBX-14044127
[6] s-center: https://www.u-blox.com/en/product/s-center
[7] ANN-MB series multi-band GNSS antennas Data sheet, doc.no. UBX-18049862

☞ 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	10-Jul-2018	ghun/byou	Initial release.
R02	19-Oct-2018	byou	Updates for the C099-F9P rev. B board revision.
R03	09-Jan-2019	olep	Updates for FW upload procedure for ODIN-W2.
R04	21-Feb-2019	olep	Updated Arduino J9 schematics. Polarity requirement of the battery connector.
R05	25-Sep-2019	jhak/jjus	Updates for the C099-F9P rev. C board revision.
R06	07-Nov-2019	jhak	Updates for the C099-F9P rev. E board revision. Connectivity SW renamed u-connectXpress.
R07	05-Dec-2019	mala	Improved the quality of the schematics drawings.
R08	09-Apr-2020	jhak/mala	Added a missing step about selecting EVK-ODIN-W2 via ST-LINK in section “u-connectXpress software”.
R09	29-June-2020	ghun	Update for HPG 1.13

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Support: support_tw@u-blox.com