QGNSS User Guide

GNSS Module Series

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About the Document

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1.0	2020-01-03	Initial
2.0	2023-05-23	1. Updated the tool version to V1.8. 2. Numerous changes were made to this document. It should be read in its entirety. 3. Adjusted the scope of application from LC79D to all GNSS modules.
2.1	2023-10-16	1. Updated the tool version to V1.9. 2. Added QuecRTK function (*Chapter 1*). 3. Updated Deviation Map and related icons to show more detailed positioning information (*Chapter 2.2.3.5*). 4. Added the “Calculation Distance” tool in the coordinate converter window (*Chapter 2.2.5.3*). 5. Added QuecRTK Client and Data Monitor pages (*Chapters 3.8.2* and *3.8.3*). 6. Added the figure of firmware download process (*Figure 50*).
2.2	2024-01-09	Updated the tool version to V1.10.

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1 Introduction

QGNSS is a tool that allows you to interact with Quectel GNSS modules quickly and easily. It enables evaluation, performance testing, development and debugging of Quectel GNSS modules. Tool features are listed below:

- Supports receivers utilizing standard NMEA strings in compliance with NMEA 0183 V4.11 and previous versions.
- Supports the parsing of RTCM3.x protocol messages.
- Supports log replay.
- Presents all the information collected by the GNSS device. All aspects of GNSS data (positioning, velocity, time, satellite tracking, etc.) can be monitored and logged under various test scenarios for receiver evaluation.
- Supports the downloading of AGNSS data.
- Supports NTRIP client.
- Supports the downloading of firmware update packet to GNSS positioning modules.
- Supports QuecRTK.

2 User Interface Description

2.1. Main Window

The window illustrated below is the main display window of QGNSS. It shows the menu bar, tool bar and positioning information. You can open the sub-window in the central area.

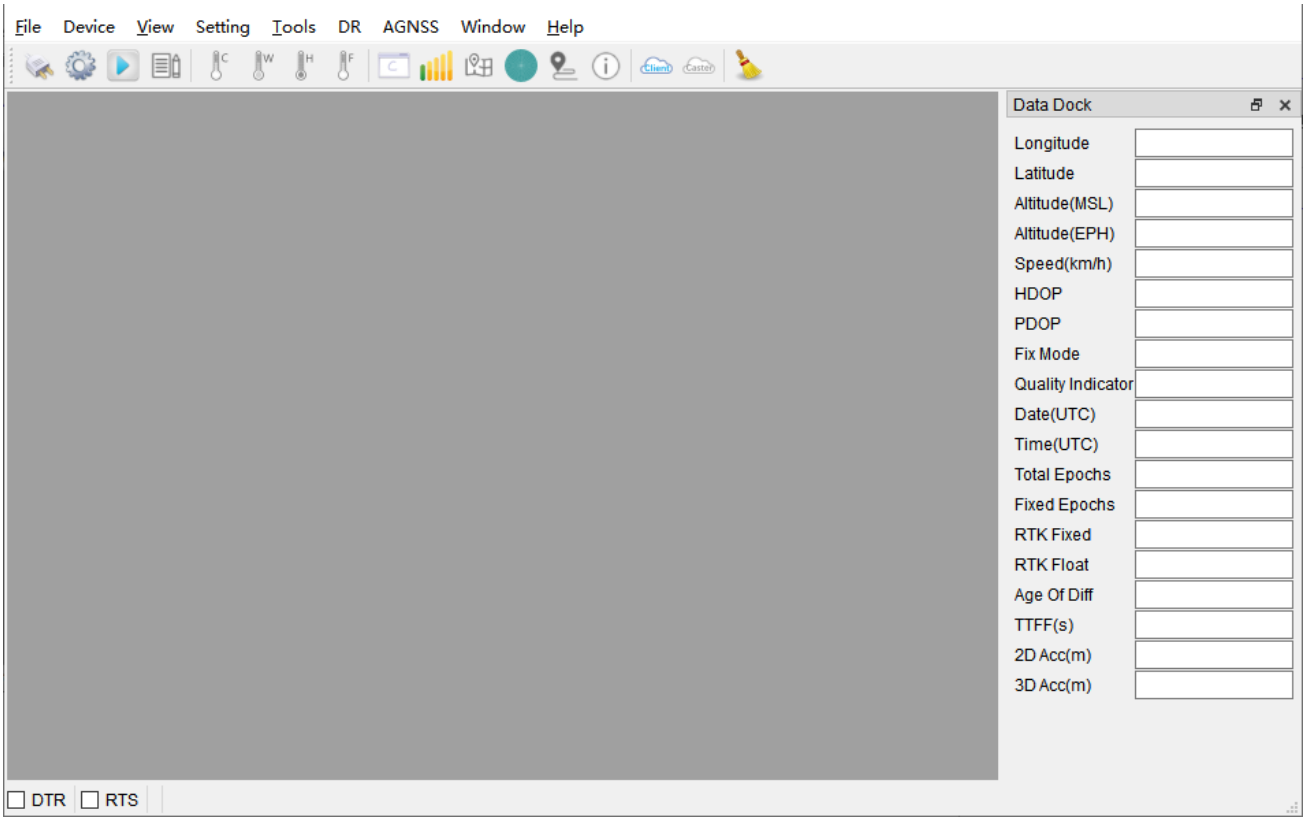


Figure 1: Main Window

2.2. Menu Bar

2.2.1. File Tab

In the "**File**" tab menu:

- Click "**Open**" to open the play dialog box. See *Chapter 3.2 Log Play* for details.
- Click "**Show Logfile in Explorer**" to open the folder of the saved log file.
- Click "**Quit**" to close QGNSS.

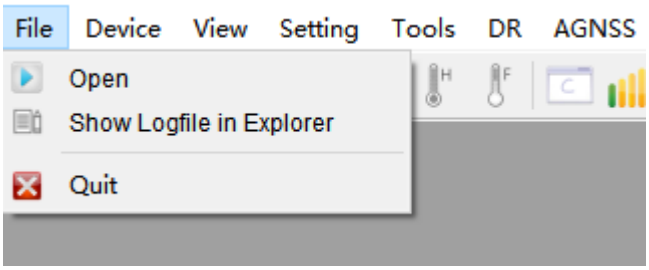


Figure 2: File Tab

2.2.2. Device Tab

In the "**Device**" tab menu:

- Click "**Connect**" to connect to the receiver.
- Click "**Set Device Information**" to configure serial port information. See *Chapter 3.1 Connect to Receiver* for details.

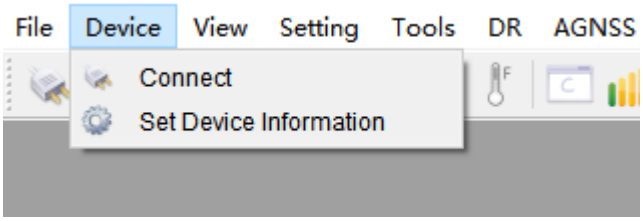


Figure 3: Device Tab

NOTE

Make sure to configure the serial port information before connecting to the receiver.

2.2.3. View Tab

In the "**View**" tab menu:

- Click "**Clear**" to clear the data displayed in the Unparsed Data, Text Data and Binary Data.
- Click "**Online Map**" to view the real time location reported by the module on a map.

See the following sections for more details about other tabs.

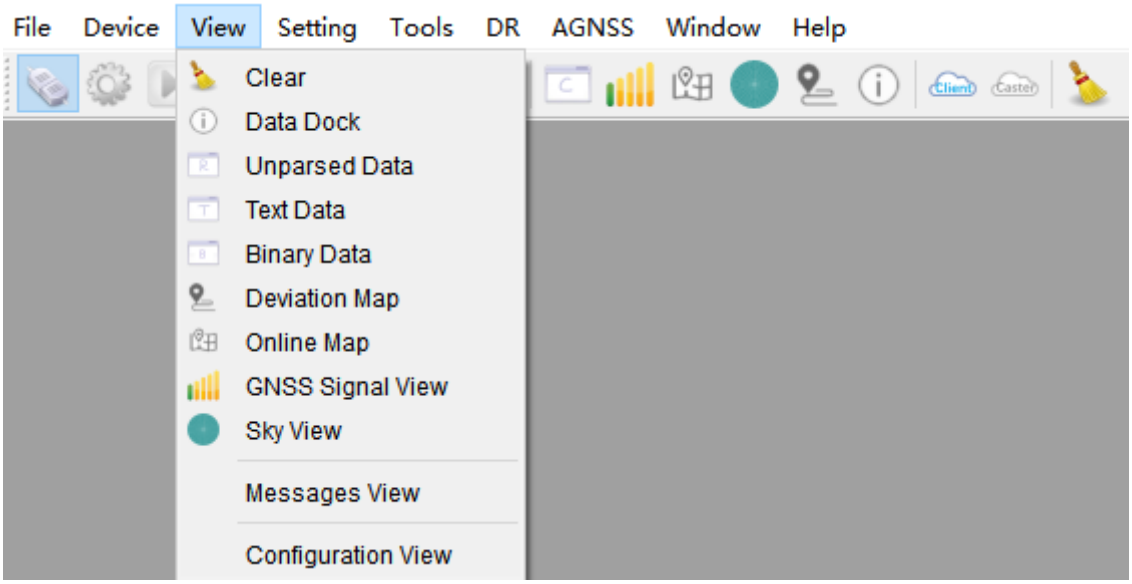


Figure 4: View Tab

2.2.3.1. Data Dock Sub-Window

The “**Data Dock**” sub-window displays detailed information such as longitude and latitude, altitude, and fix mode.

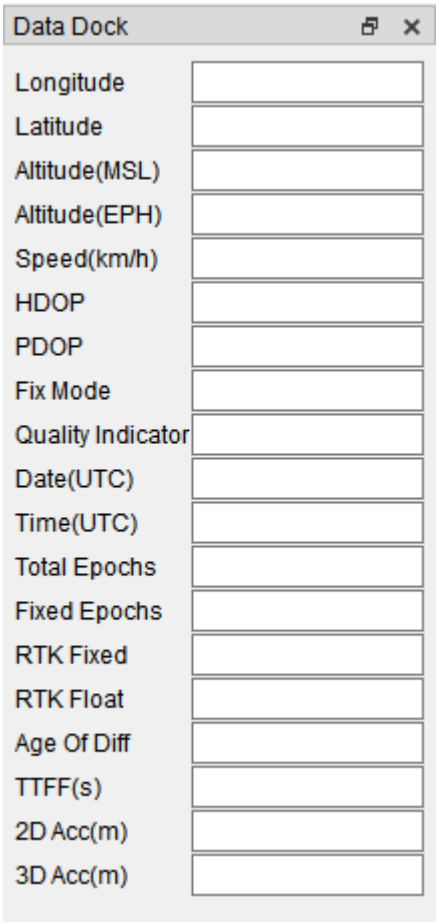


Figure 5: Data Dock Sub-Window

2.2.3.2. Unparsed Data Sub-Window

The "**Unparsed Data**" sub-window displays data sent by the receiver, and offers control options at the bottom such as "**Clear**", "**Timestamp**", and "**Pause**" buttons, along with and "**Filter**" feature.

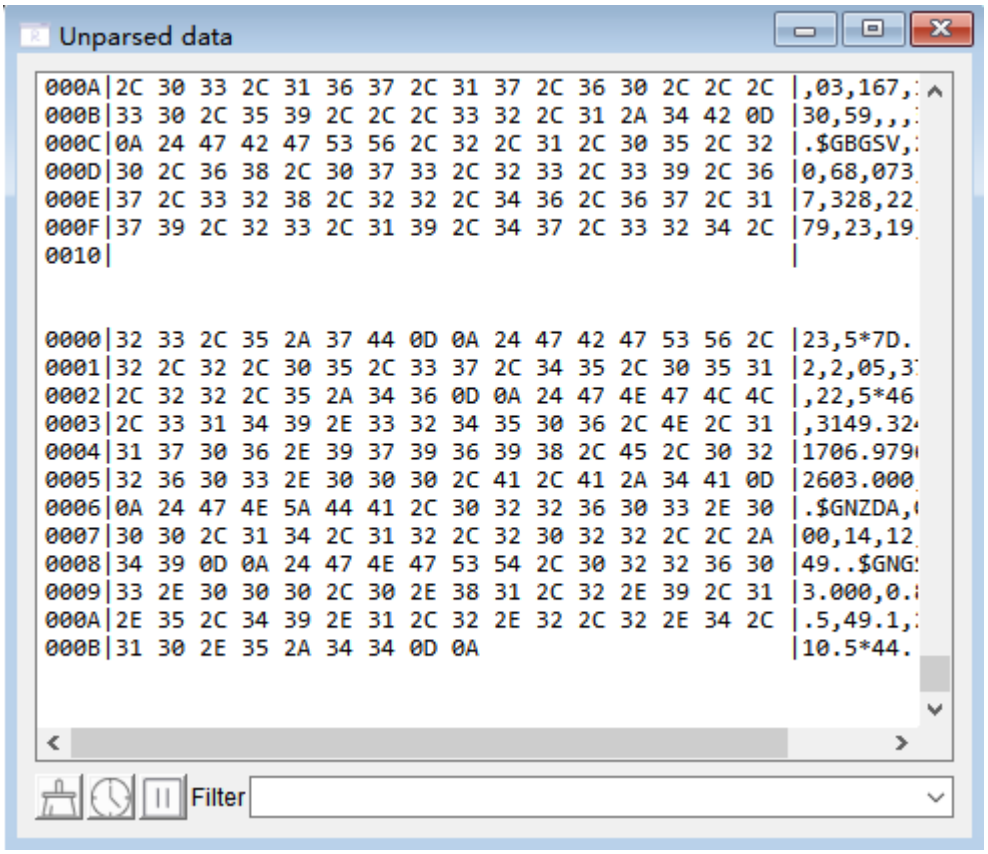


Figure 6: Unparsed Data Sub-Window

2.2.3.3. Text Data Sub-Window

The “**Text Data**” sub-window displays the NMEA messages, and offers control options at the bottom such as “**Clear**”, “**Timestamp**”, and “**Pause**” buttons, and with a “**Filter**” feature.

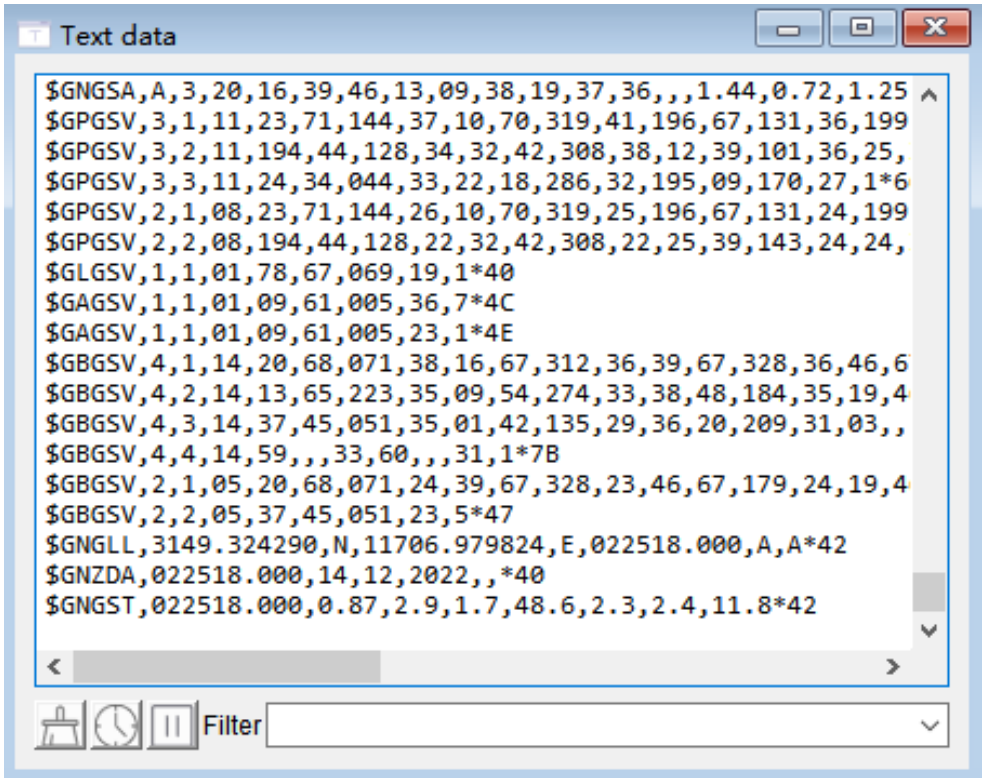


Figure 7: Text Data Sub-Window

2.2.3.4. Binary Data Sub-Window

The “**Binary Data**” sub-window displays the message of the binary protocol, and offers control options at the bottom such as “**Clear**”, “**Timestamp**”, and “**Pause**” buttons, and a “**Filter**” feature.

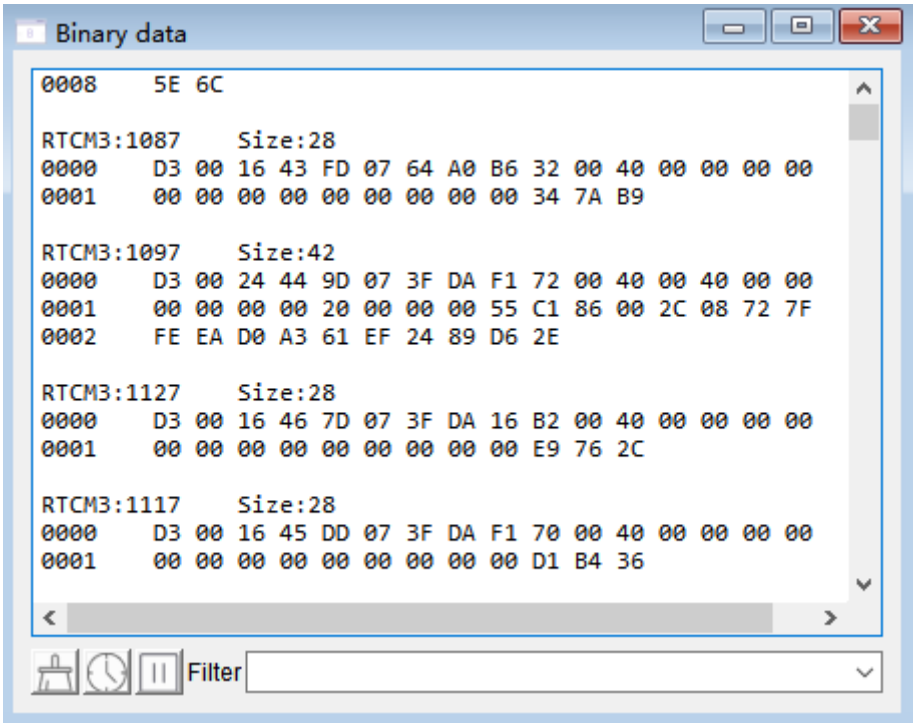


Figure 8: Binary Data Sub-Window

2.2.3.5. Deviation Map Sub-Window

The "**Deviation Map**" sub-window displays positions in longitude and latitude relative to the initial positioning point.

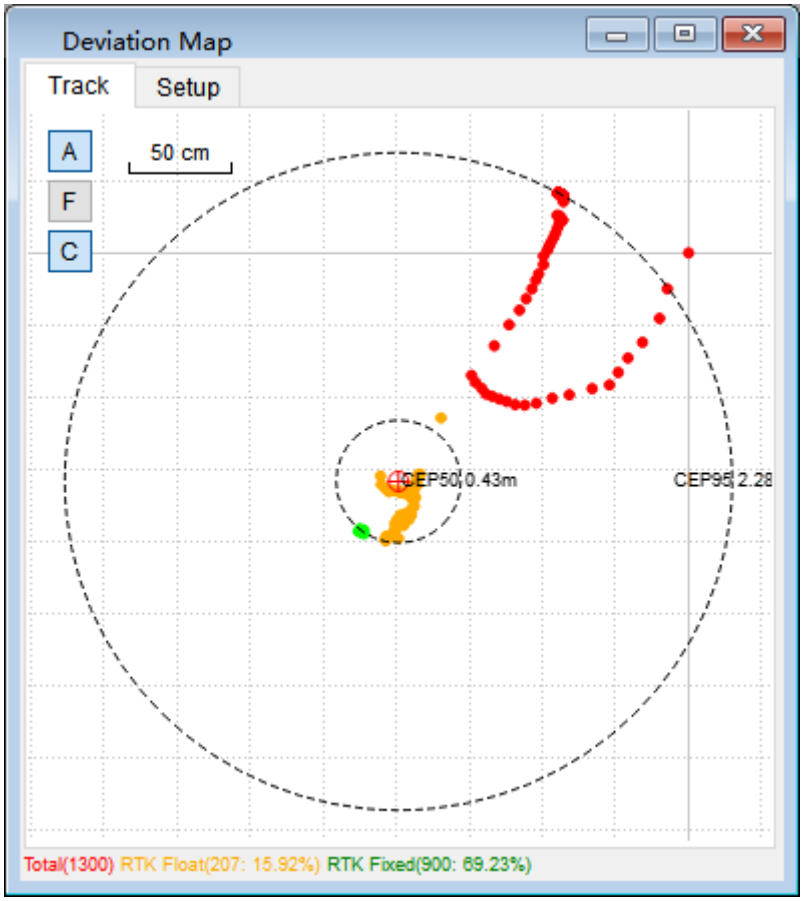


Figure 9: Deviation Map Sub-Window

NOTE

Use the mouse scroll wheel to zoom in/out on the deviation map and hold down the mouse scroll wheel to drag the deviation map.

Table 1: Deviation Map Function Description

Icon	Description
‘A’	Display the average point
‘F’	Fit track
‘C’	Display CEP circle. Use the average point as a reference point by default
Red Point	Normal positioning point without RTK
Yellow Point	RTK Float positioning point
Green Point	RTK Fixed positioning point
Total (1300)	All positioning point counts
RTK Float (207: 15.92%)	Float point number and proportion
RTK Fixed (900: 69.23%)	Fixed point number and proportion
Setup	Click to set the reference point to calculate CEP

2.2.3.6. GNSS Signal View (Signal Level) Sub-Window

The sub-window in the figure below ("**Signal Level**") displays GNSS signal view. The number above the flag represents the C/N_0 value. You can use the checkbox to select the satellite system to be displayed. If the flag is transparent, it means that the receiver is not tracking this satellite constellation and therefore there is no data available in NMEA GSA messages.

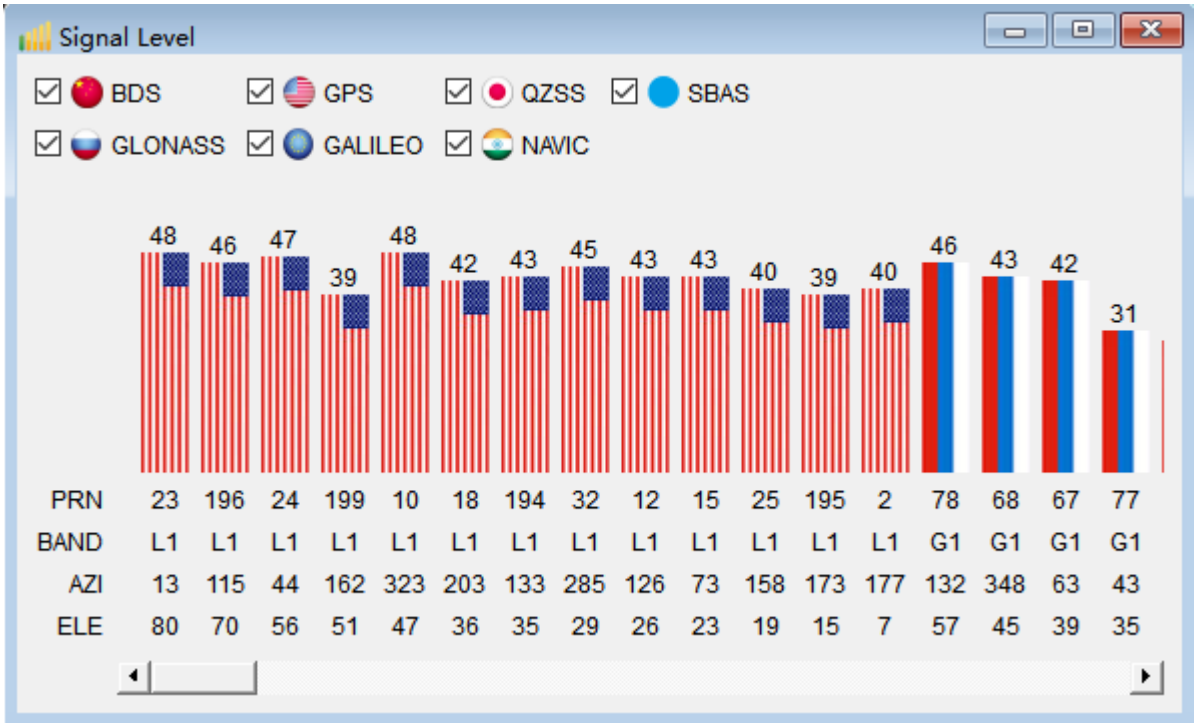


Figure 10: Signal View (Signal Level) Sub-Window

Table 2: Signal View Function Description

Button	Description
PRN	Satellite number of visible satellites.
BAND	Satellite frequency band.
AZI	Satellite azimuth in degrees.
ELE	Satellite elevation in degrees.

2.2.3.7. Sky View Sub-Window

The "**Sky View**" sub-window displays the azimuth and elevation angle (above the Horizon) of each visible navigation satellite per constellation and counts the number of all visible satellites of each positioning system.

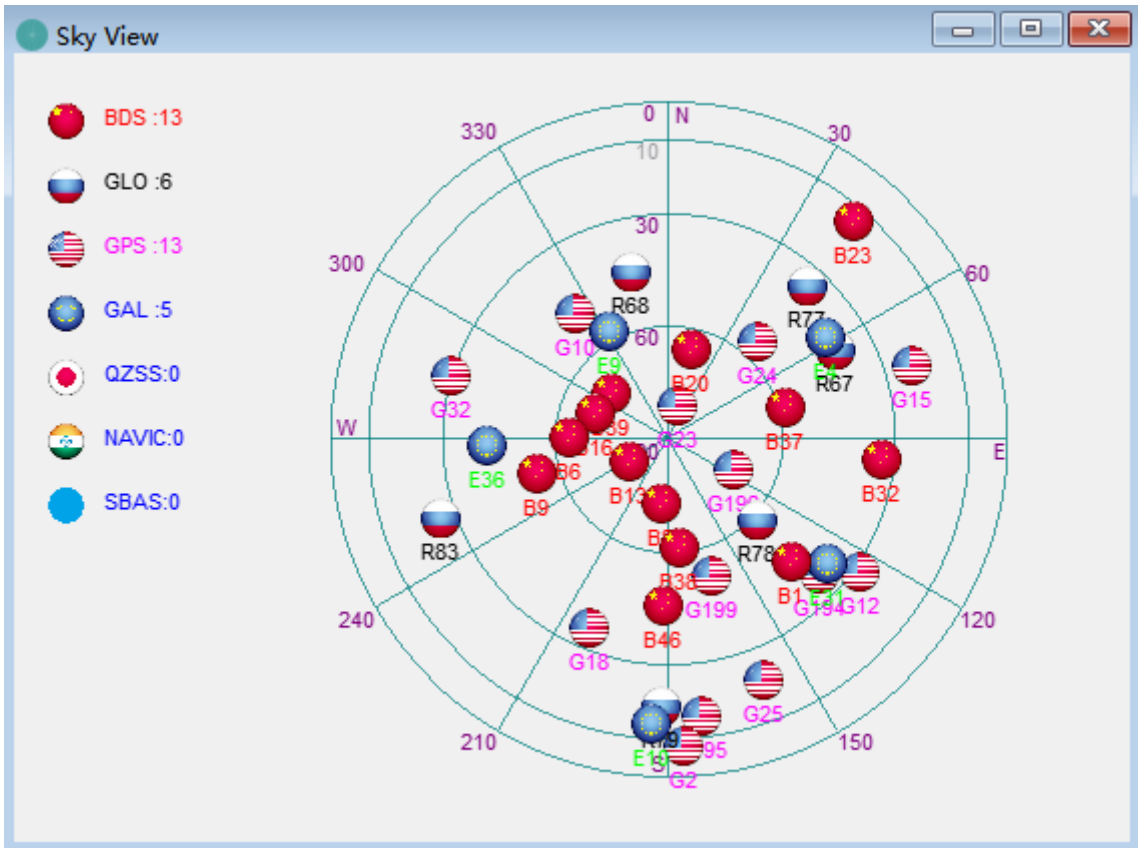


Figure 11: Sky View Sub-Window

2.2.3.8. Messages View Sub-Window

The "**Messages View**" sub-window displays the message output by the receiver in the form of a parameter table.

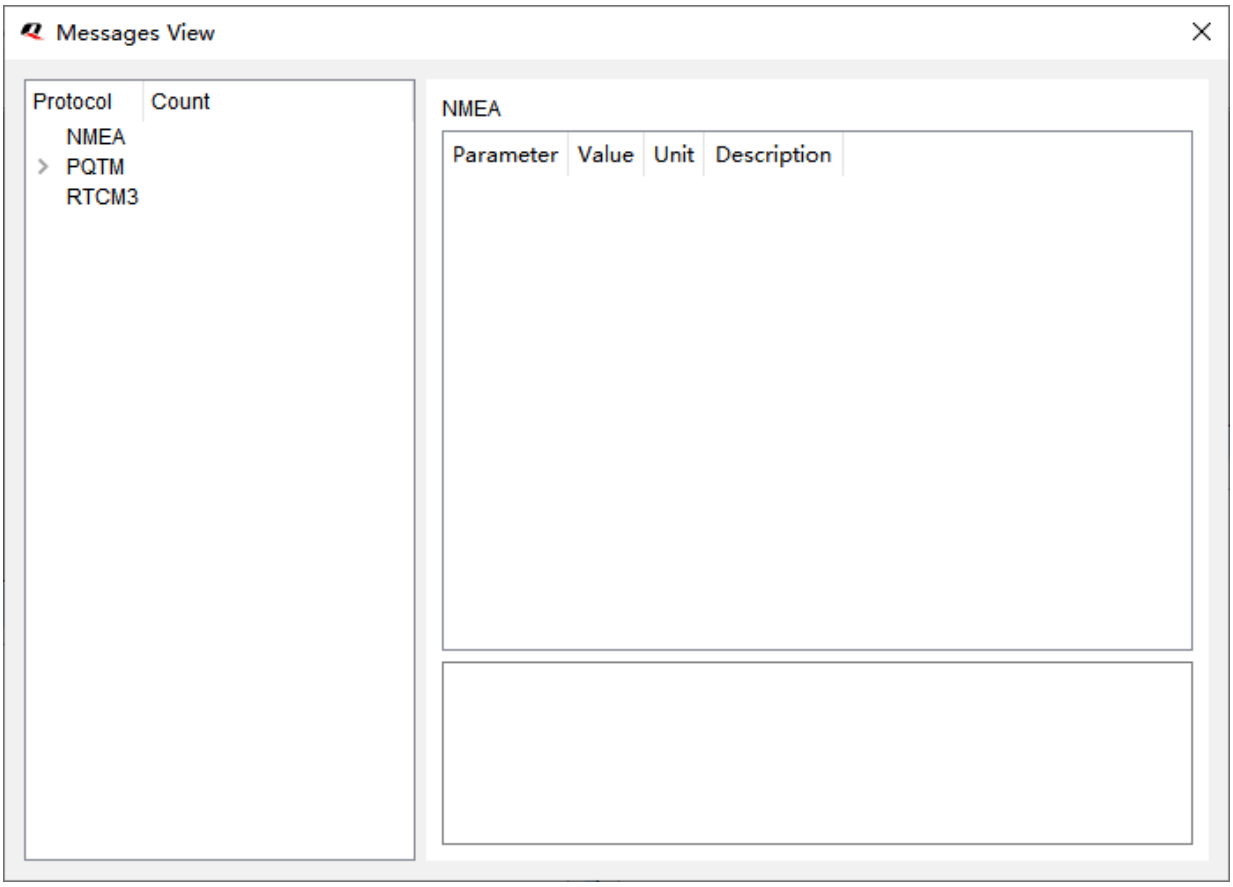


Figure 12: Messages View Sub-Window

2.2.3.9. Configuration View Sub-window

This "**Configuration View**" sub-window is used to modify the receiver configuration. The configuration parameters may change depending on module type.

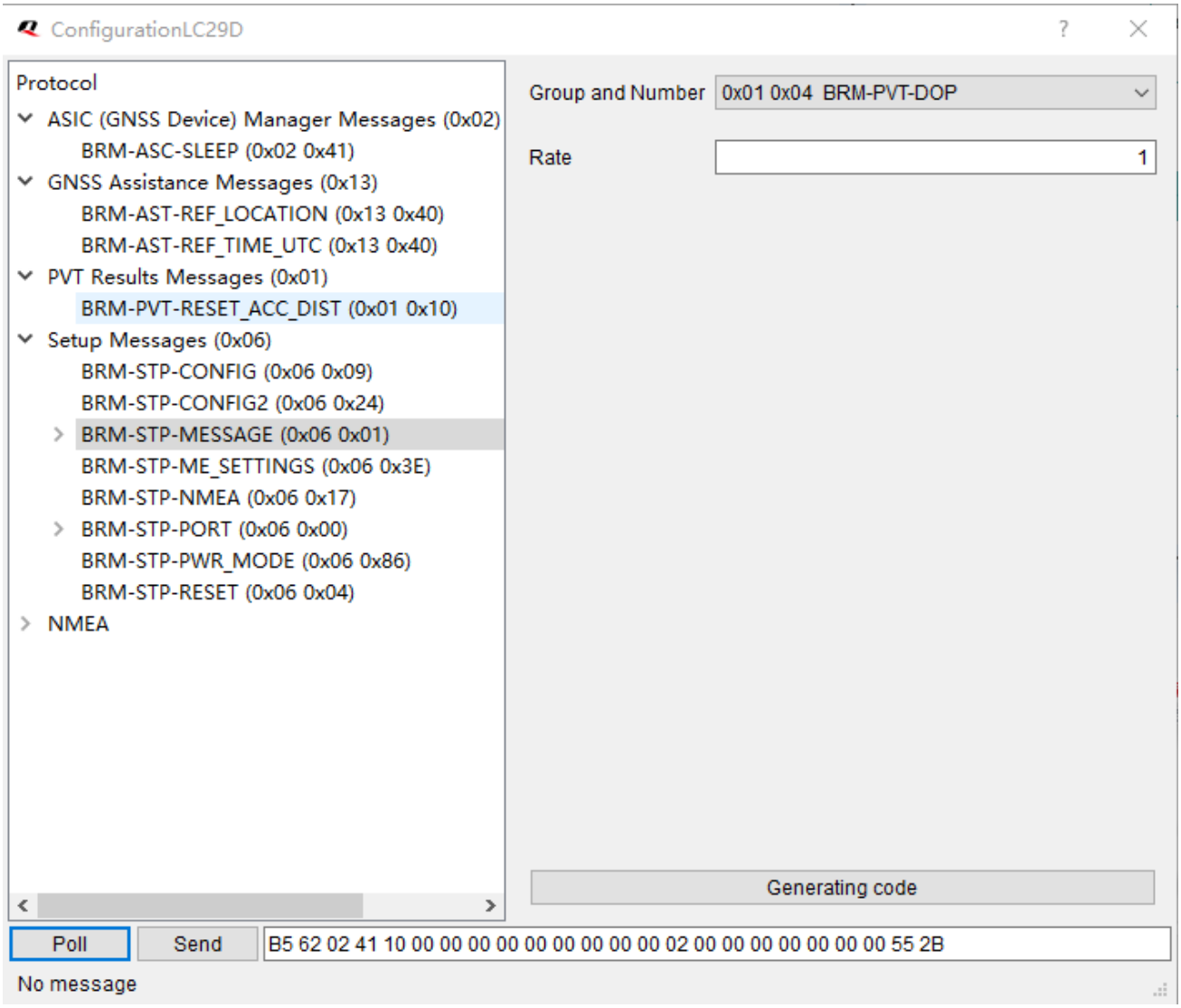


Figure 13: Configuration View Sub-Window

2.2.4. Setting Tab

Click "**Preferences**" to enter the Preferences Dialog, and set the supported protocol to parse in the Preferences Dialog.

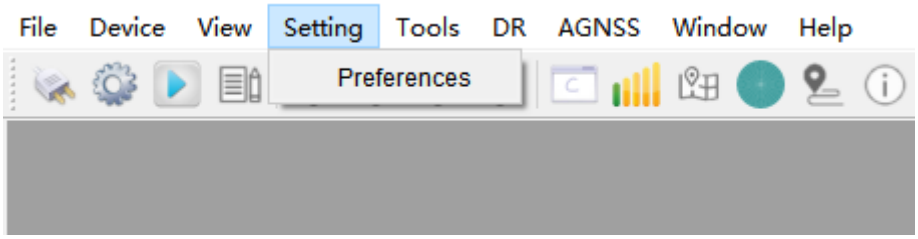


Figure 14: Setting Tab Menu

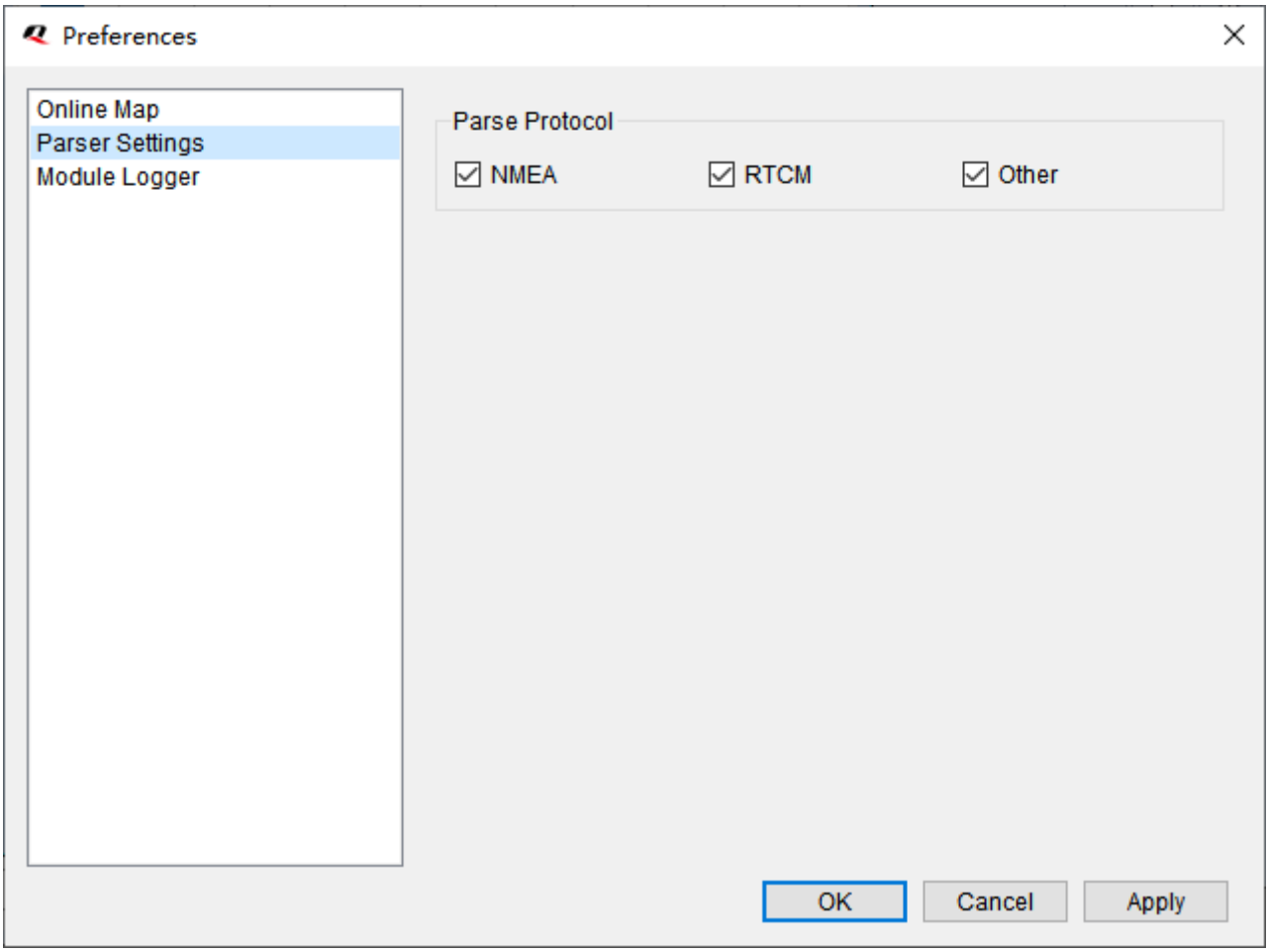


Figure 15: Settings Dialog

2.2.5. Tools Tab

In the "**Tools**" tab menu:

- Select "**Command Console**" to send commands. See *Chapter 3.6 Send Command* for details.
- Select "**Static TTFF Testing**" to open the TTFF cycle testing tool. See *Chapter 3.4 TTFF* for details.
- Select "**Firmware Download**" to open the receiver firmware upgrade tool. See *Chapter 3.9 Firmware Download* for details.
- Select "**QGNSS log**" to open the log analysis tool and follow the step-by-step instructions.
- Select "**NTRIP**" to connect to NTRIP server. See *Chapter 3.8 NTRIP* for details.
- "**Switch Online Map**" can switch between the online maps used by QGNSS.
- Select "**NMAE Convert KML**" to open the tool for converting NMEA logs to a KML file. See *Chapter 2.2.5.2 NMEA Convert KML* for details.
- Select "**Coordinate Converter**" to open the coordinate conversion tool. See *Chapter 2.2.5.3 Coordinate Converter* for details.

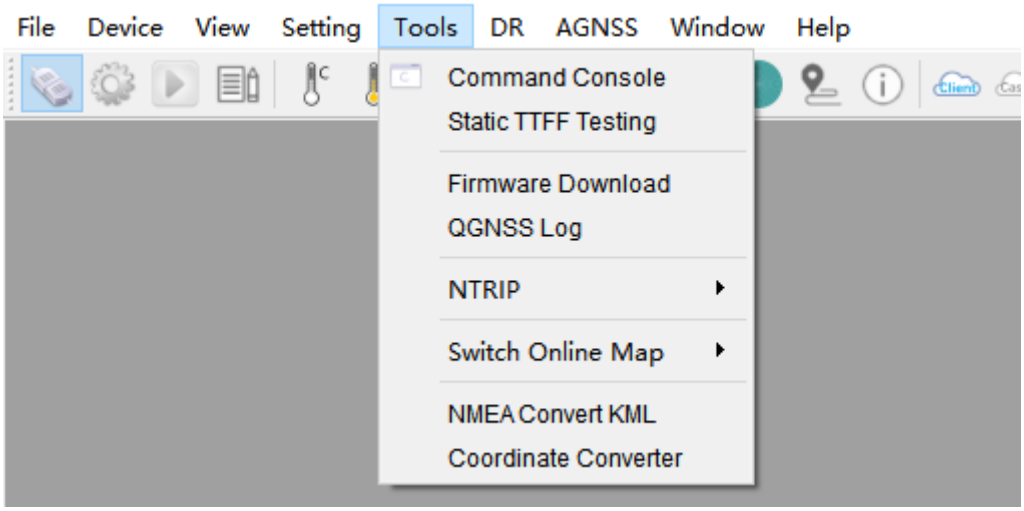


Figure 16: Tools Tab Menu

2.2.5.1. Command Console

The "**Command Console**" tool is used for sending a command.

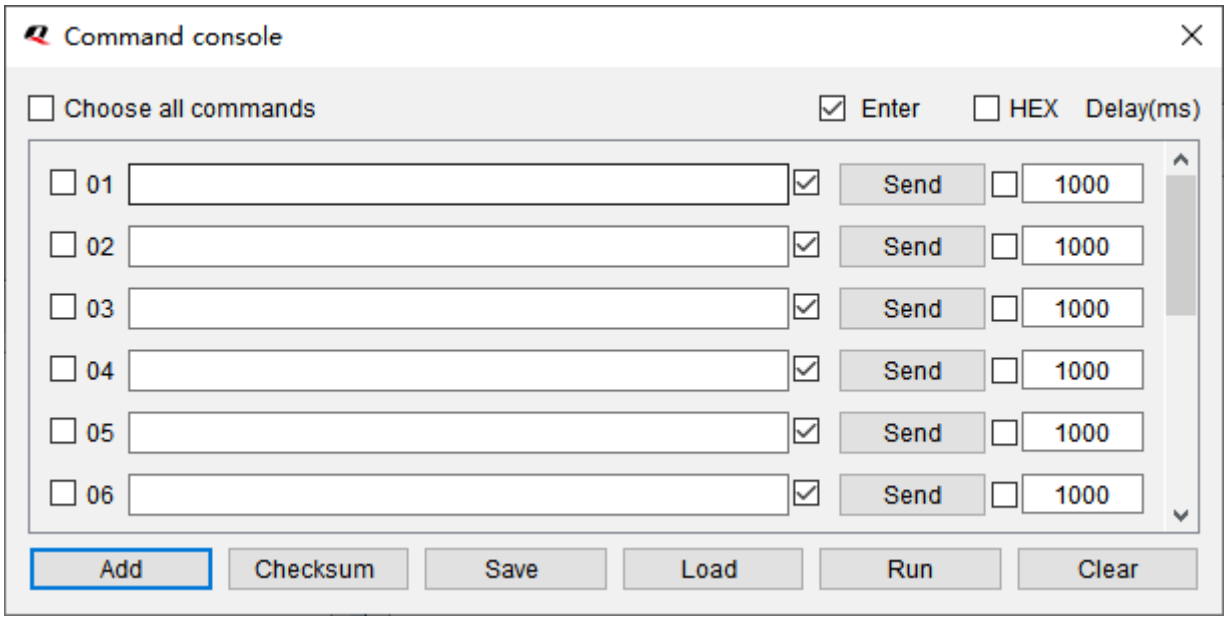


Figure 17: Command Console Tool

Table 3: Command Console Function Description

Button	Description
Enter	Whether "\r\n" is added behind the command.
HEX	If a binary command is sent, HEX checkbox should be selected.
Delay (ms)	After the command is sent, delay N milliseconds to send the next one.
Adds	Add the number of sent commands, and support 99 commands at most.
Checksum	Calculate Checksum for all NMEA commands.
Save	Save the command of the current window to the configuration file.
Load	Load the command from the configuration file to the window.
Run	Send the selected commands in a loop.
Clear	Clear all commands.

2.2.5.2. NMEA Convert KML

The "**NMEA Convert KML**" tool is used for converting NMEA logs to a KML format file.

- Click "**File Name(s)**" to select the NMEA file.
- Click "**File Name**" to select the output file location.
- Click "**OK**" to wait for the conversion to complete.

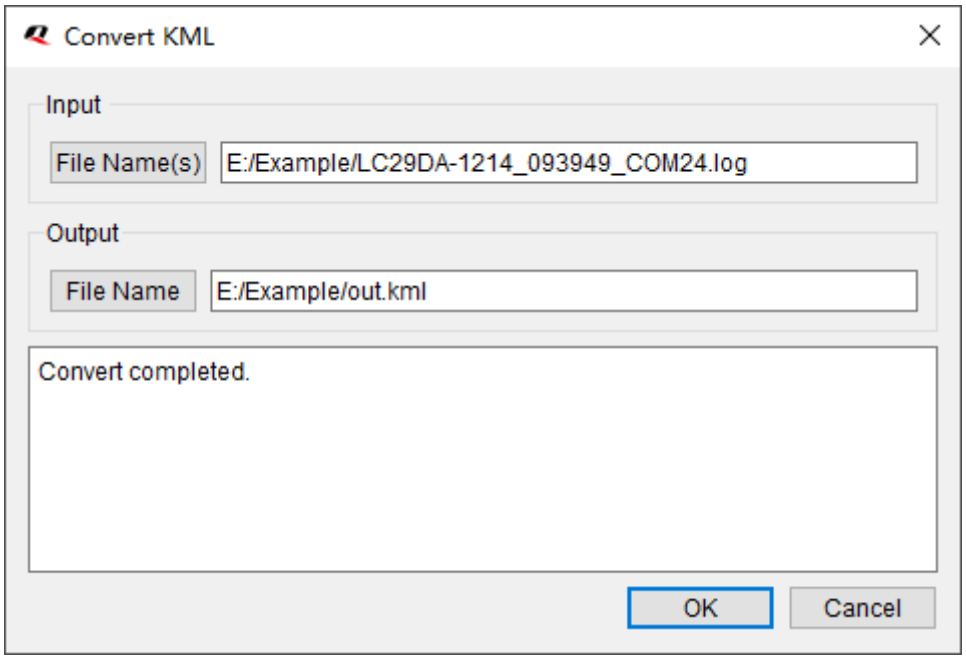


Figure 18: NMEA Convert KML Tool

2.2.5.3. Coordinate Converter

1. In the "**Coordinate Converter**" tool:

- Select **LLA(Deg)**, **LLA(Deg,Min)**, **LLA(Deg,Min,Sec)** or **ECEF(XYZ)** format and type in the corresponding values, taking "**LLA(Deg)**" as an example:

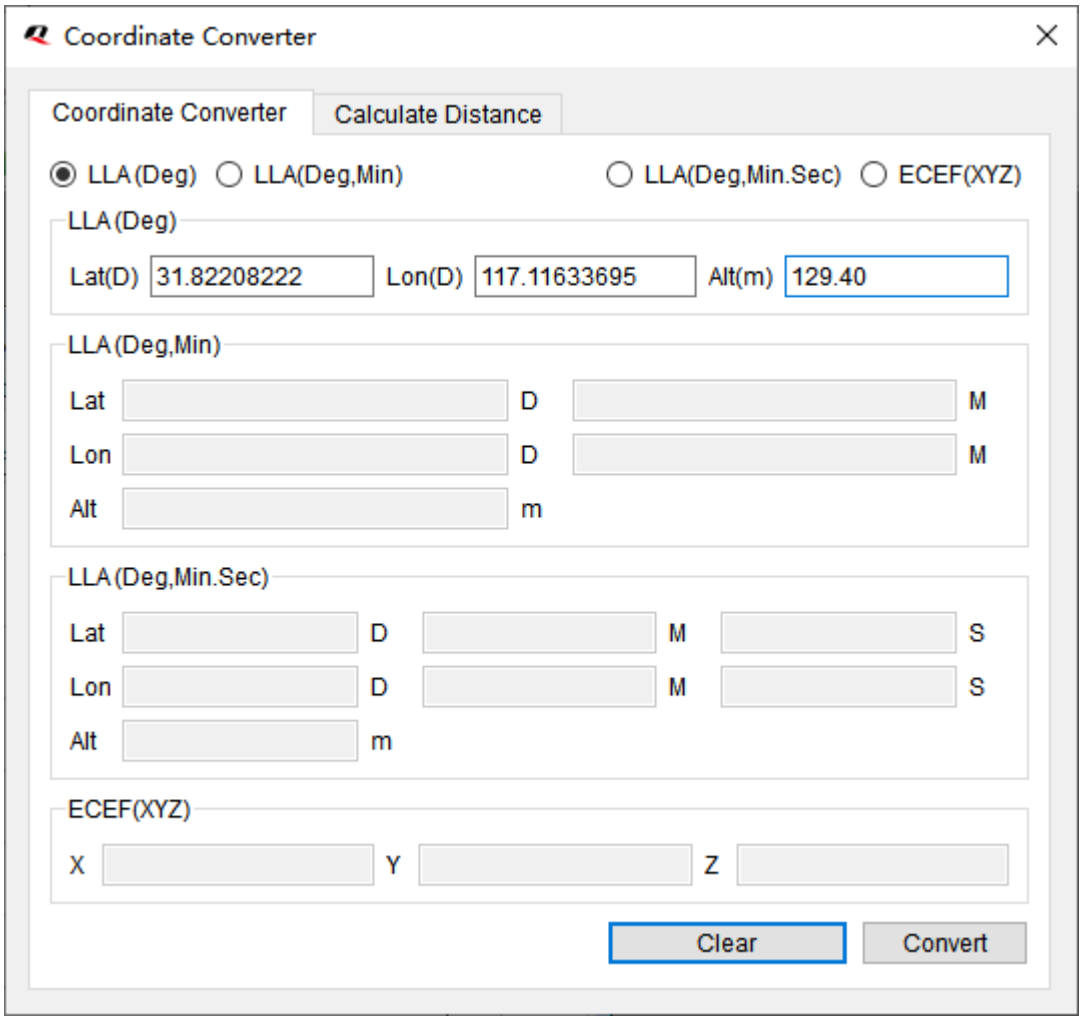


Figure 19: Coordinate Converter Tool – Enter Values

- Click “**Convert**” and the tool will convert the values to other formats.

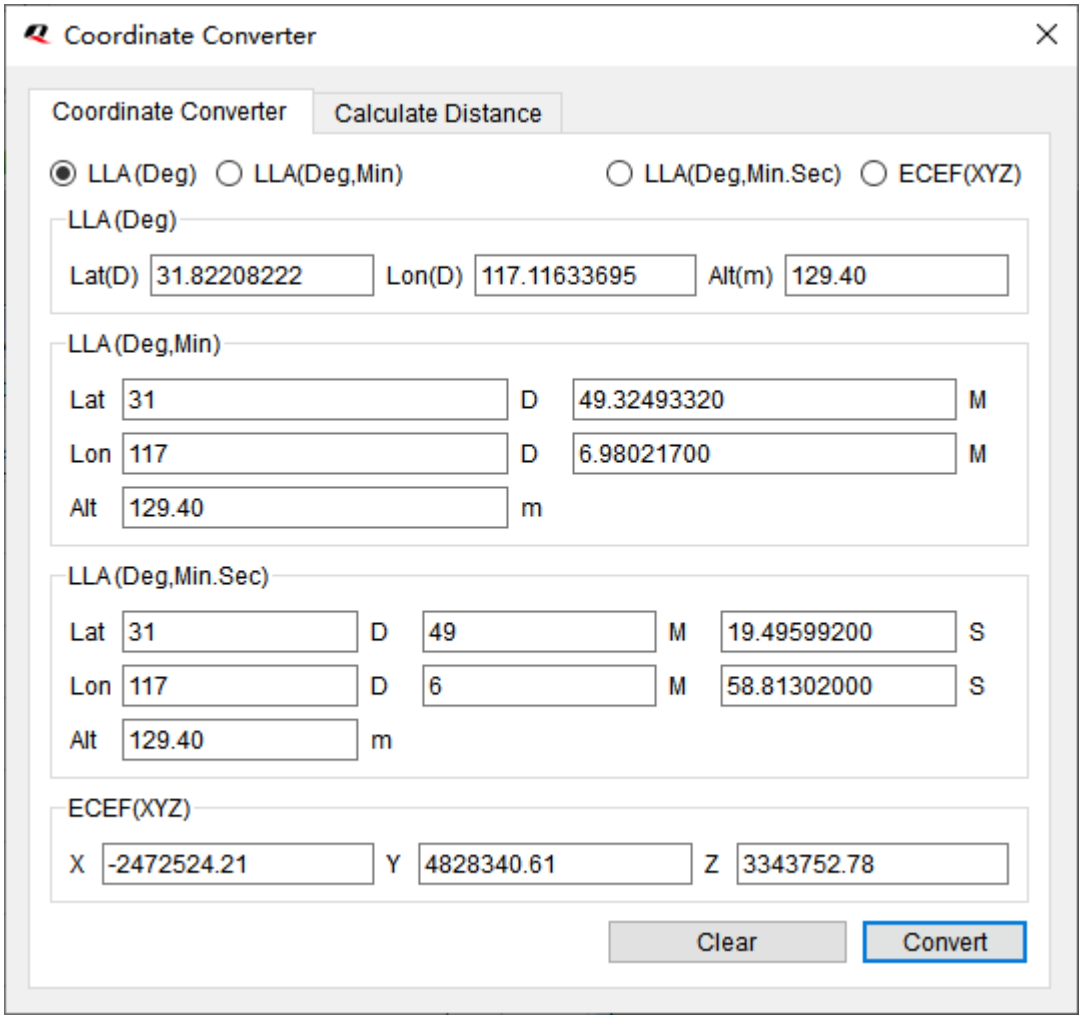


Figure 20: Coordinate Converter Tool – Convert Values

2. In the "**Calculate Distance**" page:

- Enter the latitude and longitude of starting and end points to calculate the straight-line distance between two points.

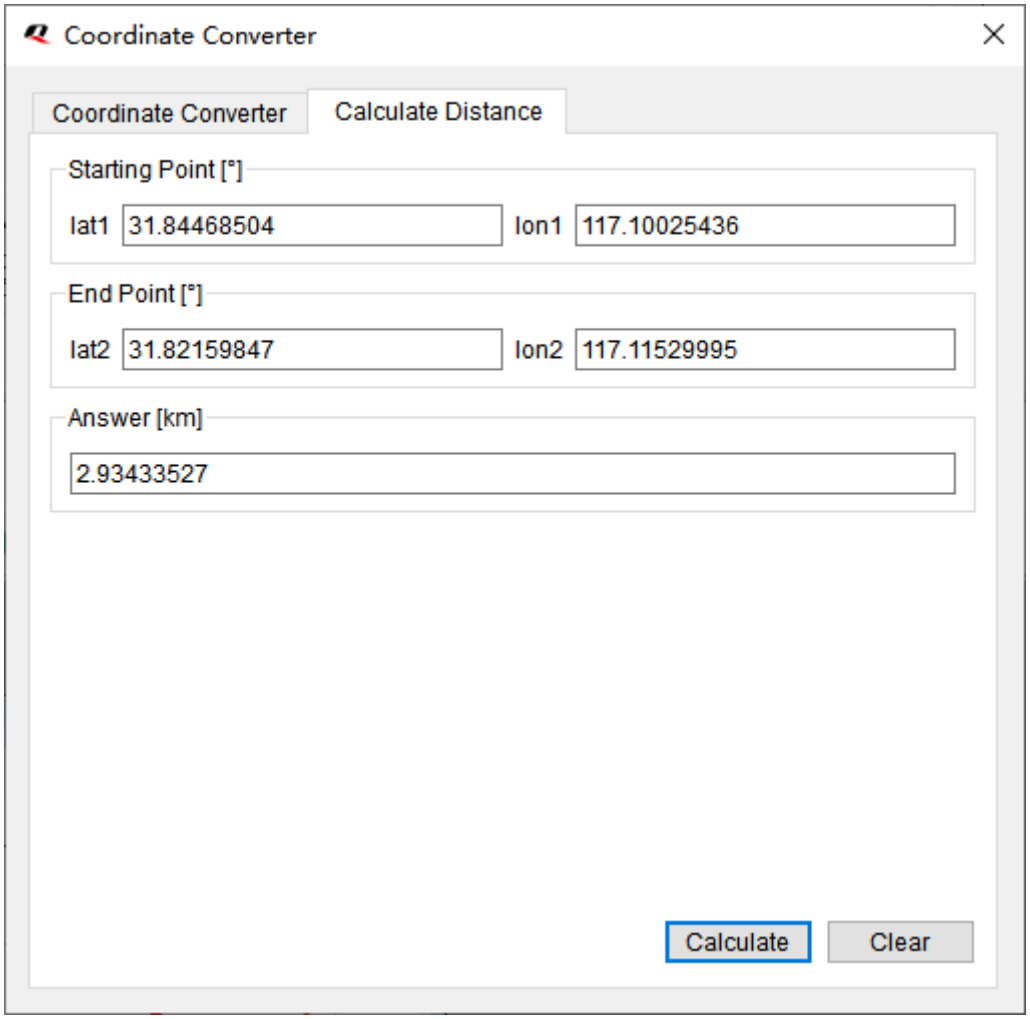


Figure 21: Calculate Distance Tool

2.2.6. DR Tab

In the "**DR**" tab menu, you can query the DR status of the receiver. DR interface status differs with module types.

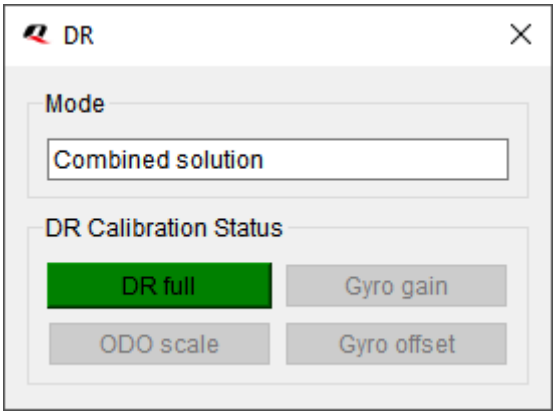


Figure 22: DR Status Window

2.2.7. AGNSS Tab

Via the "**AGNSS**" window, you can download AGNSS files from the FTP server and download AGNSS data to the receiver through the serial port. See *Chapter 3.7 Send AGNSS Data* for details.

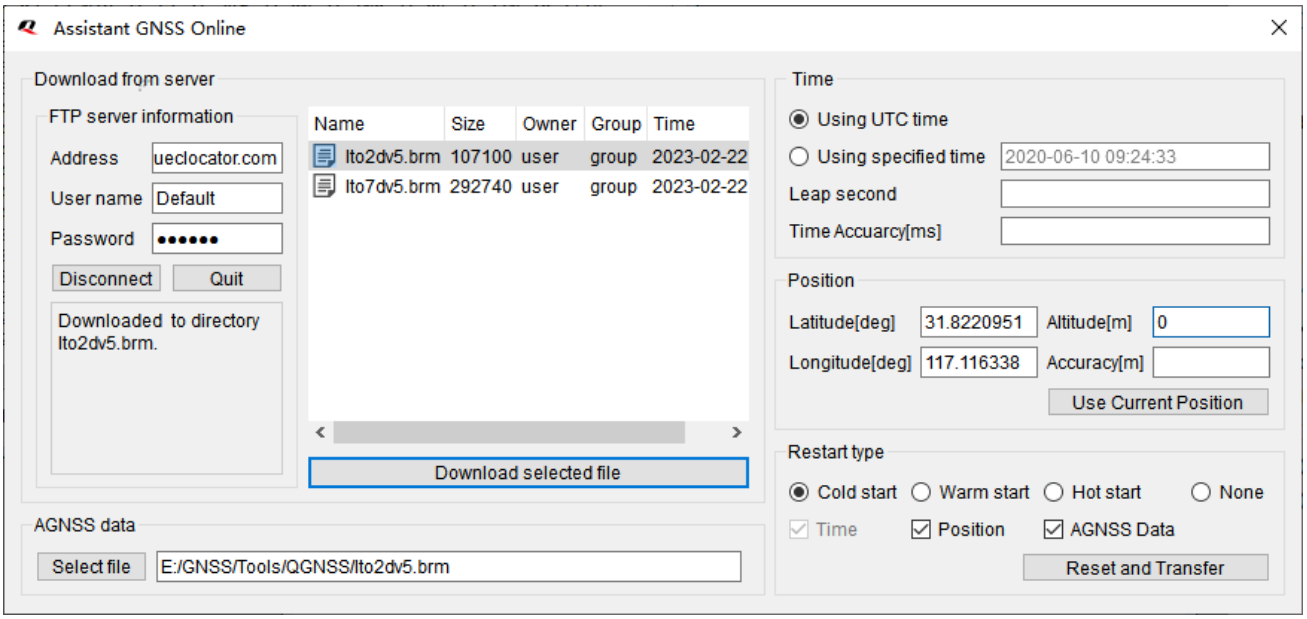


Figure 23: AGNSS Window

2.2.8. Windows Tab

In the "**Windows**" tab menu:

- Click "**Tile pattern**" to display the sub-window(s) to the center.
- Click "**Cascade**" to stack the sub-window(s) to the center.
- Click "**Close All**" to close all sub-windows.

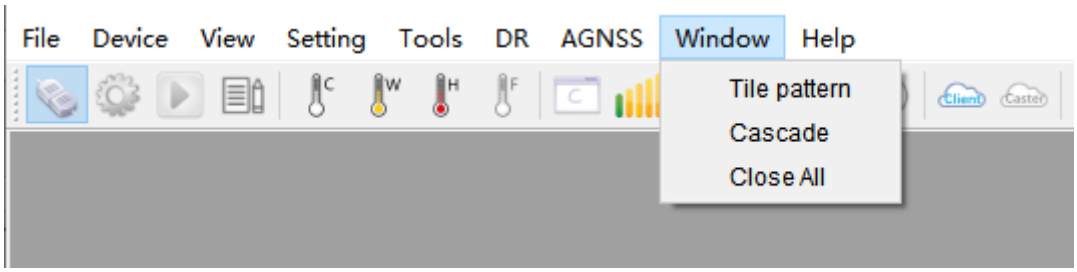


Figure 24: Window Tab Menu

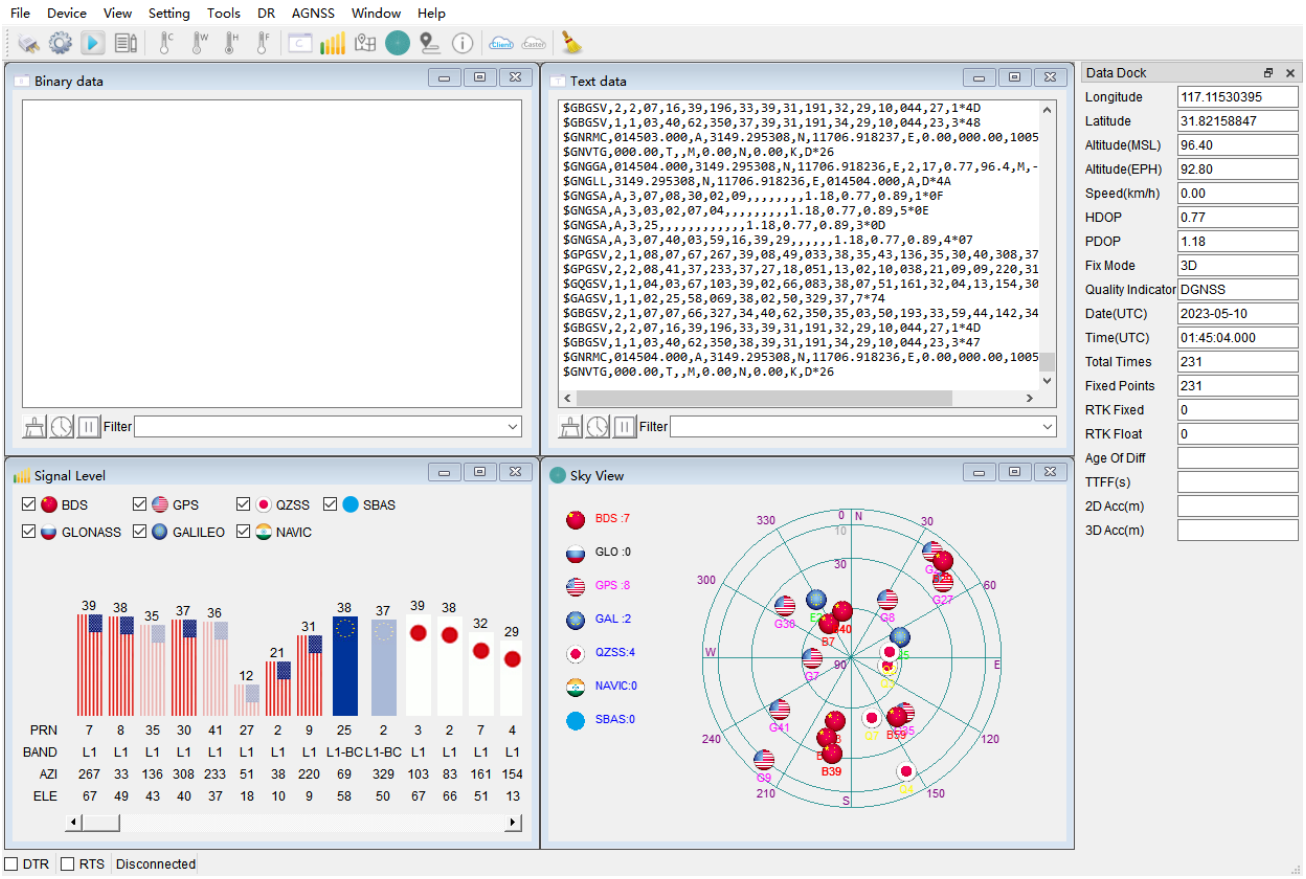


Figure 25: Tile Pattern Window

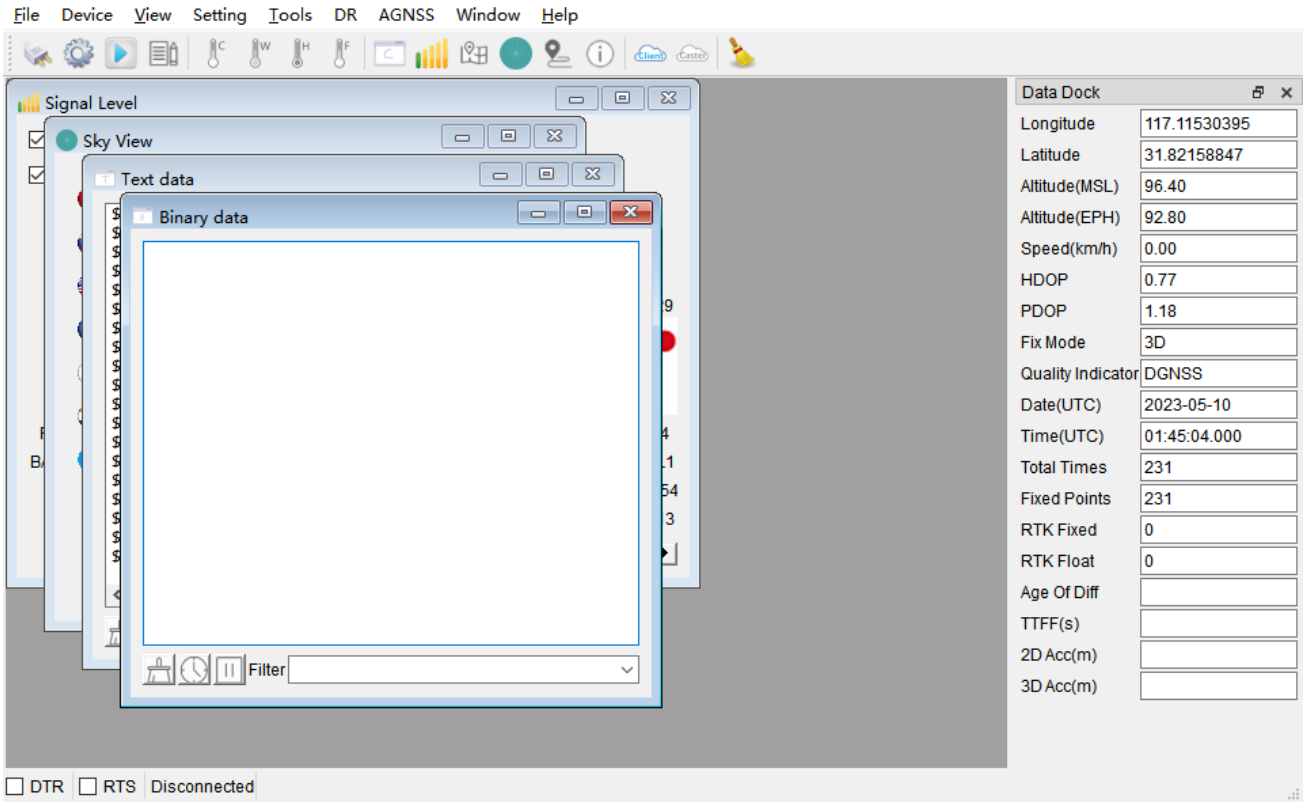


Figure 26: Cascade Window

2.2.9. Help Tab

In the "**Help**" tab menu:

- Click "**Check for Updates**" button to check if the tool is running the latest version of QGNSS.
- Click "**About**" button to see the current software version information.

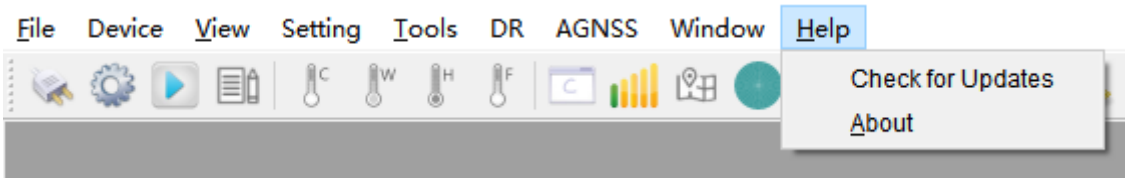


Figure 27: Help Tab Menu

2.3. Tool Bar

Tool bar can be used for quick access to common operations.

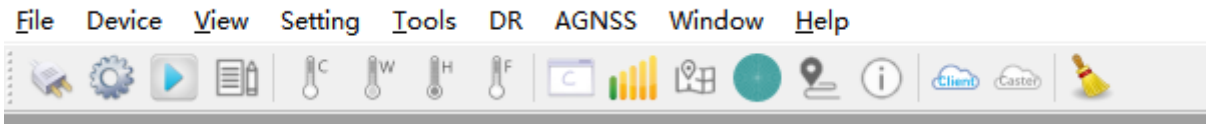


Figure 28: Tool Bar

Table 4: Description of Tool Bar Functions

Icon	Function	Description
	Connect	Connect/disconnect serial port
	Set Device Information	Select module and set serial parameter(s)
	Open	Play log file
	Show Logfile in Explorer	Open the folder containing the saved log file(s)
	Cold Start	Send a Cold start command
	Warm Start	Send a Warm start command
	Hot Start	Send a Hot start command
	Full Cold Start	Send a Full cold start command
	Command Console	Open the Command console dialog
	GNSS Signal View	Open the Signal level sub-window
	Online Map	Open the Online Map sub-window
	Sky View	Open the Sky view sub-window
	Deviation Map	Open the Deviation map sub-window

Icon	Function	Description
	Data Dock	Open the Dock window (Data Dock and Analysis)
	NTRIP Client	Open the NTRIP Client dialog
	NTRIP Caster/Server	Disabled (not supported currently)
	Clear	Clear interface data

3 Common Operations

3.1. Connect to Receiver

Follow the below steps to connect the receiver to the QGNSS software utility:

Step 1 Run the QGNSS tool.

Step 2 Click the "**Set Device Information**" button on the tool bar to open the "**Device Information**" window.

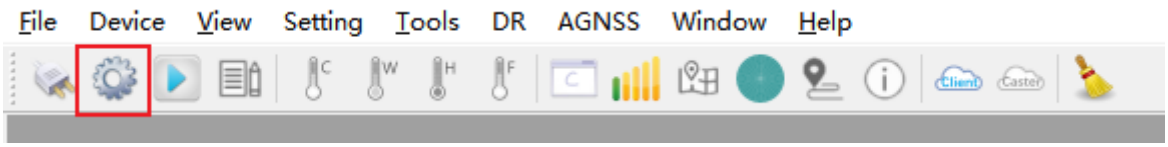


Figure 29: Open Serial Port Configuration

Step 3 Select the module and serial port parameters, and then click the "**OK**" button.

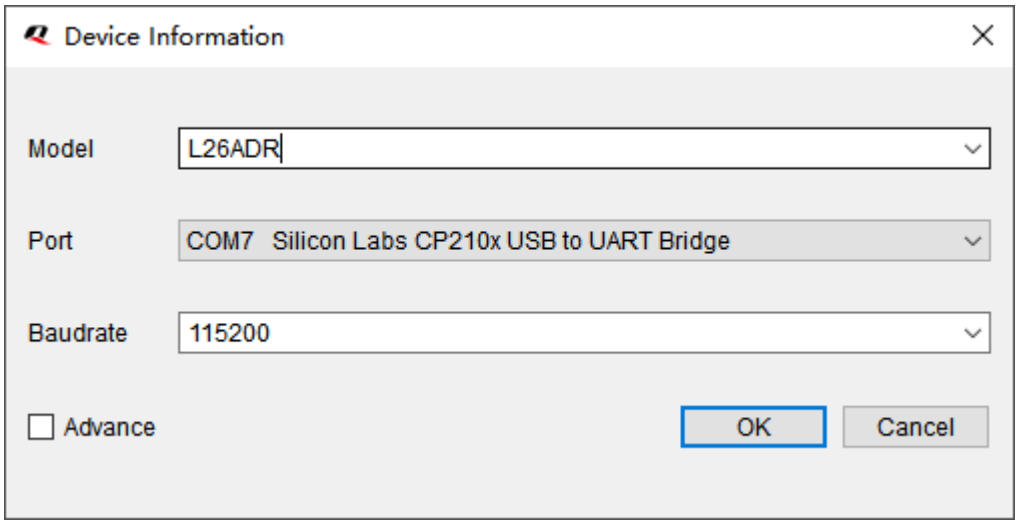


Figure 30: Serial Port Configuration Dialog

3.2. Log Play

Steps to replay a recorded log file:

Step 1 Click the "**Play**" button to open the play dialog box.

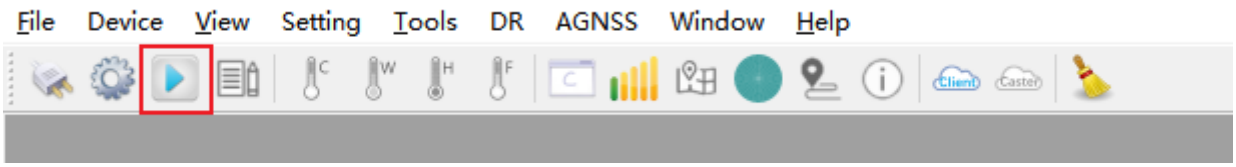


Figure 31: Log Play

Step 2 Select the file, and the play control window will pop up.

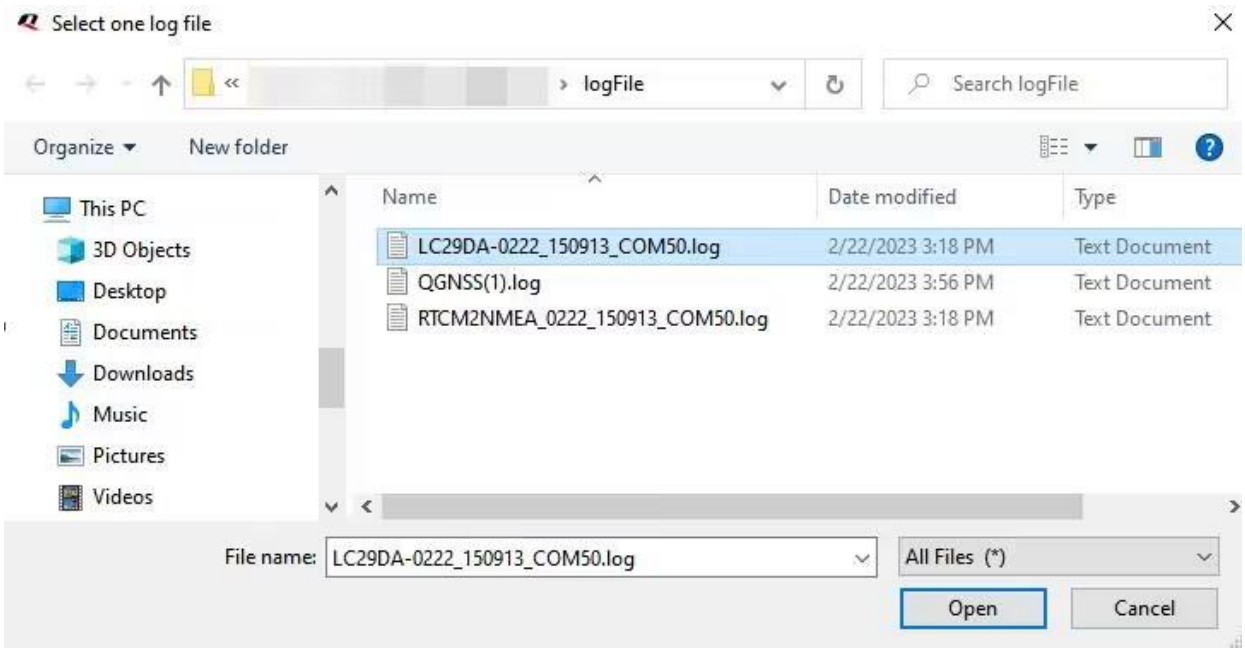


Figure 32: Select the File

Step 3 Select the Read Rate(B/s) value, and then click "**Exit**" button.

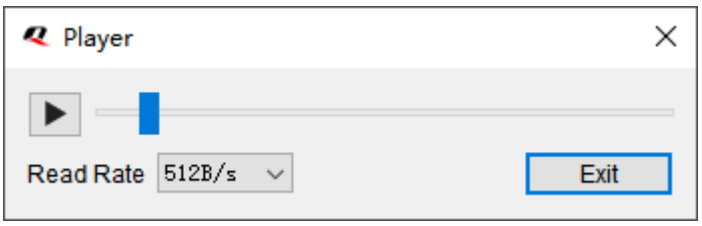
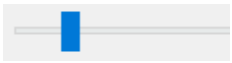
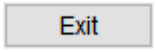


Figure 33: Play Controller

Table 5: Controller Function Description

Button	Description
	Play and pause
	Play progress bar, click to drag the progress bar.
	File reading speed
	Exit

3.3. Restart Receiver

Choose a restart type and click the corresponding button in the tool bar to send the restart command to the receiver. For the description of these buttons, see *Table 4: Description of Tool Bar Functions* .

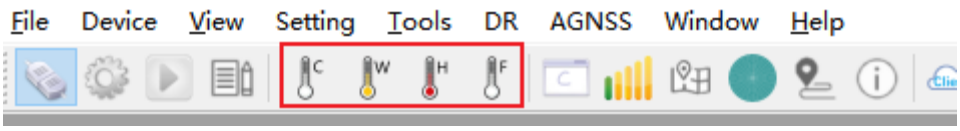


Figure 34: Restart Receiver

3.4. TTFF

Click "**Static TTFF Testing**" to open the TTFF window.

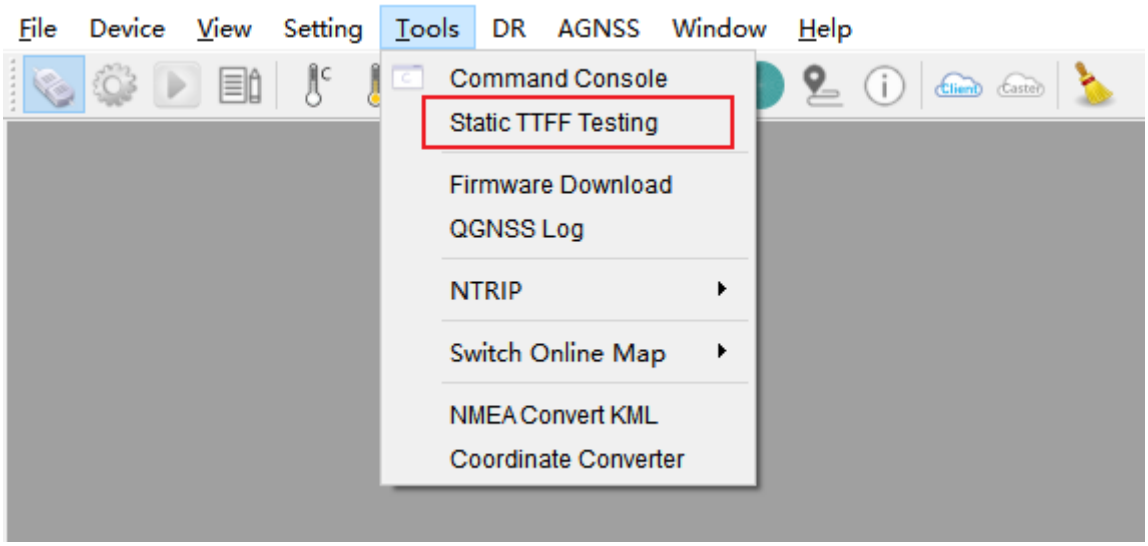


Figure 35: Open TTFF Window

Step 1 Choose a "**Restart type**".

Step 2 Enter "**Number of tests**" and the "**TTFF Time-out(Sec)**" of each test.

Step 3 Click "**Run**" button.

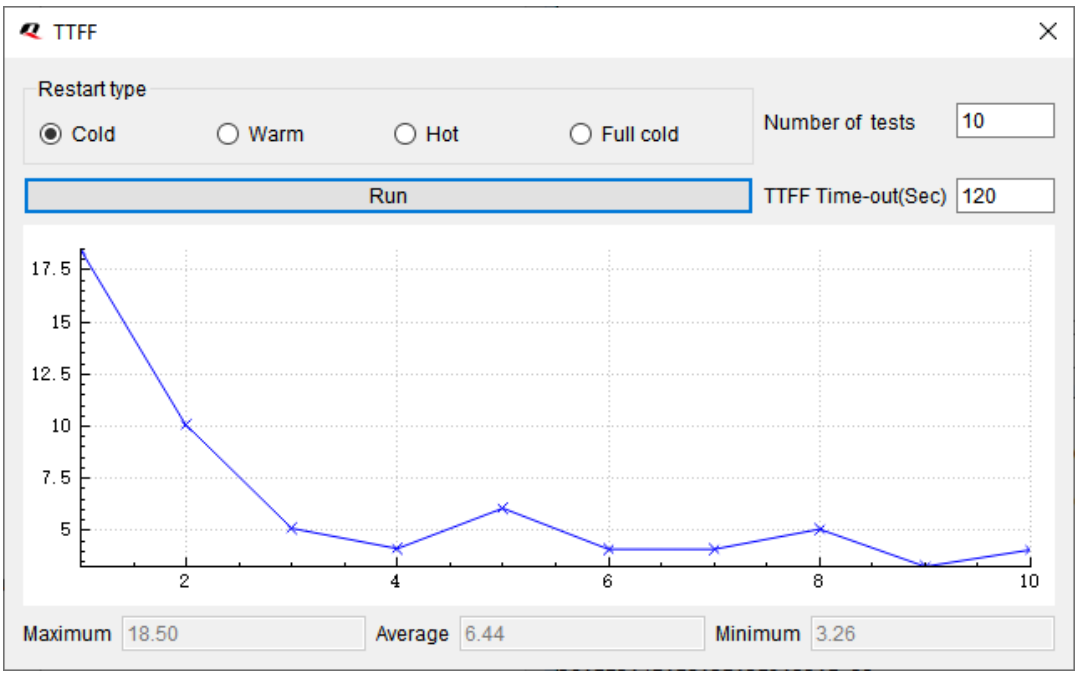


Figure 36: TTFF View

NOTE

Save the TTFF test log file (TTFF_xxx_xxx.log) in the log folder. Open the folder to view the log file.

3.5. Configure Receiver

Click "**Configuration View**" in the "**View**" tab drop-down menu to open "**Configuration View**" window.

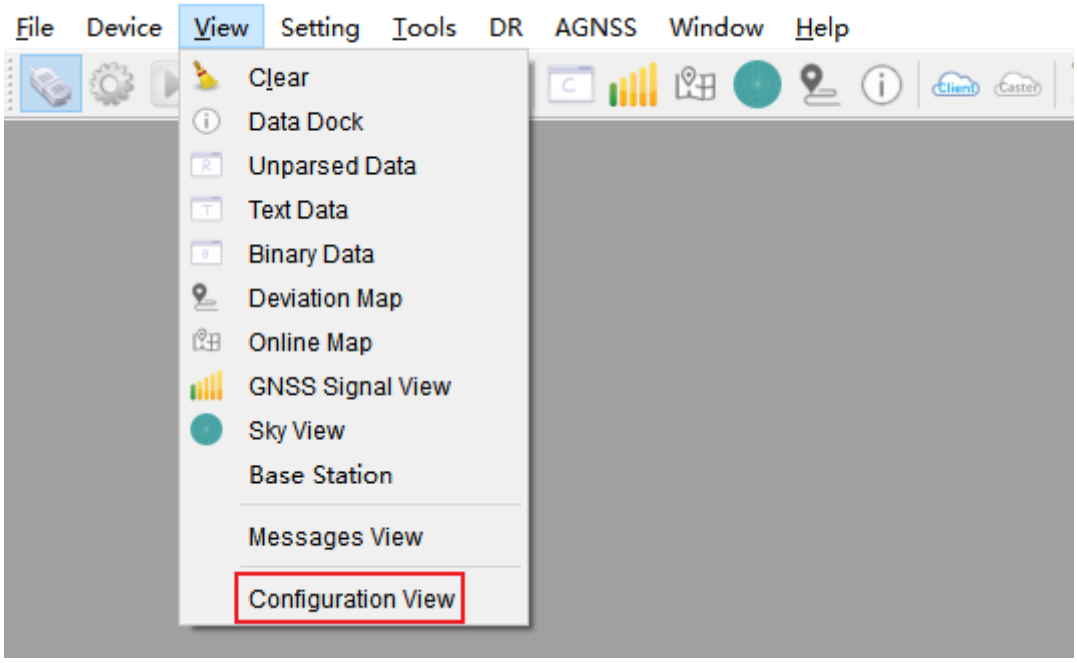


Figure 37: Open Configuration View

Step 1 Select the parameters to be configured and click "**Generating code**" button.

Step 2 Click "**Send**" button to send the generated code to the receiver.

If the parameters support the query, click the "**Poll**" button to query the configuration parameters.

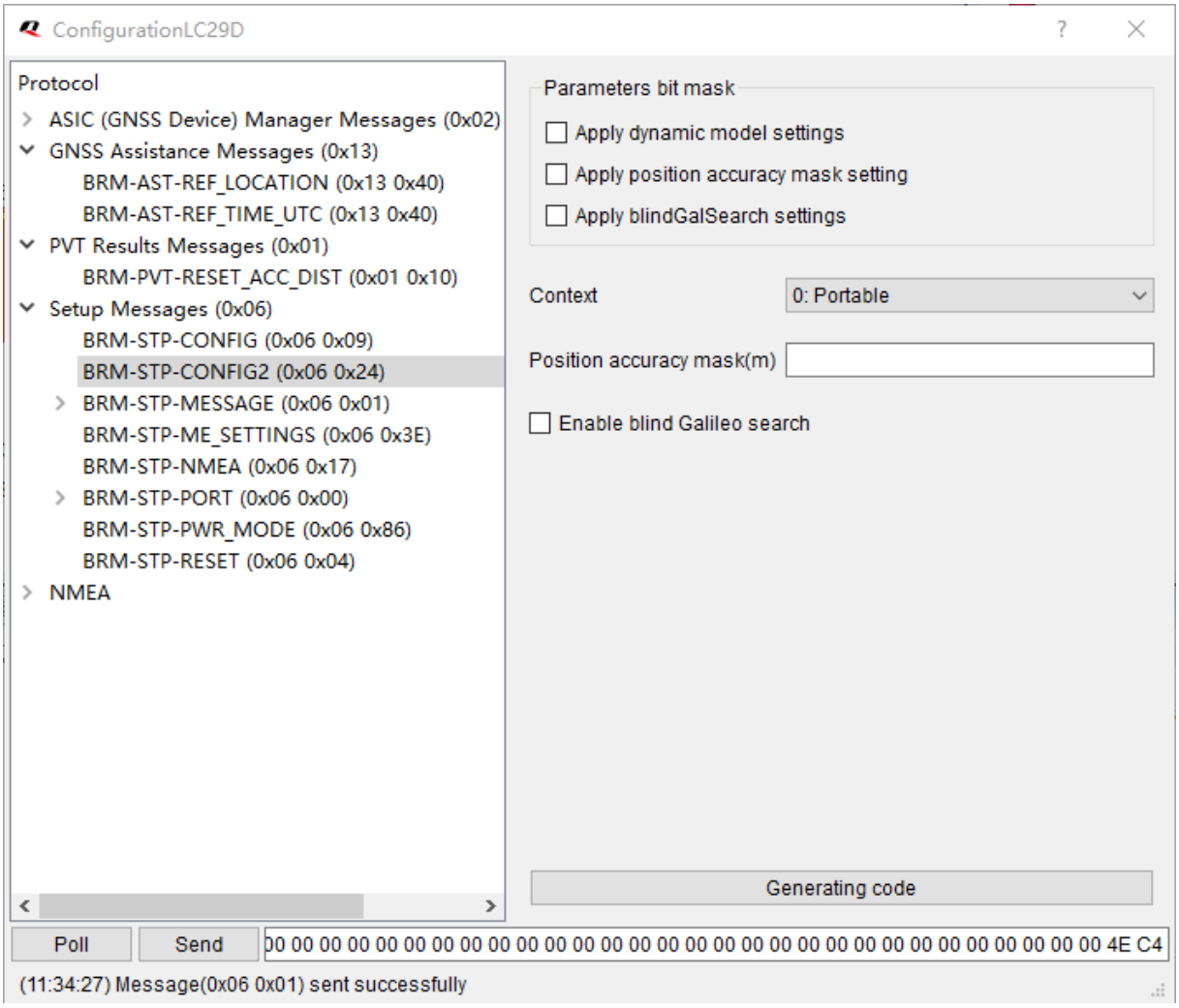


Figure 38: Configuration View

3.6. Send Command

Click the "**Command Console**" in the "**Tools**" tab drop-down menu to open "**Command Console**" window. See *Figure 17 Command Console Tool* for details of "**Command Console**" interface.

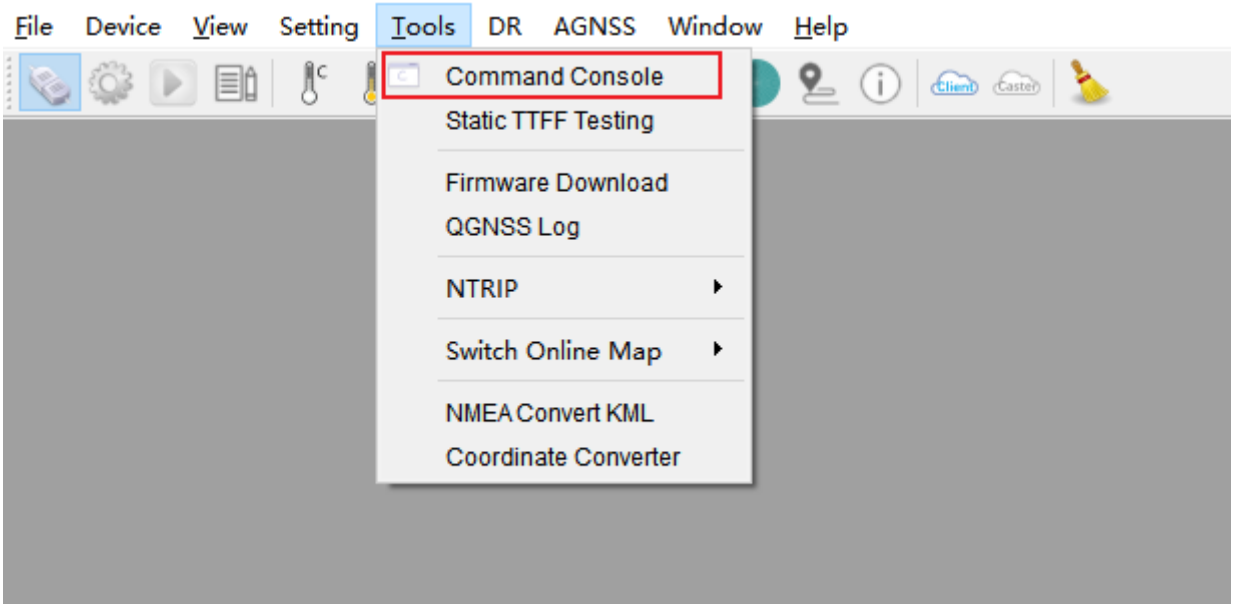


Figure 39: Open Command Console

Send one command at a time:

1. Enter the command to be sent in the command box.
2. Click "**Send**" to send the command.

Send the selected commands in a loop:

1. Enter the commands to be sent in the command boxes one by one.
2. Select the checkboxes of the commands to be sent.
3. Click "**Run**" to send the commands in a loop.

For description of the functions of other buttons, see *Table 3: Command Console Function Description*.

3.7. Send AGNSS Data

Click "**Assistant GNSS Online**" in the "**AGNSS**" tab drop-down menu to open "**AGNSS**" window.

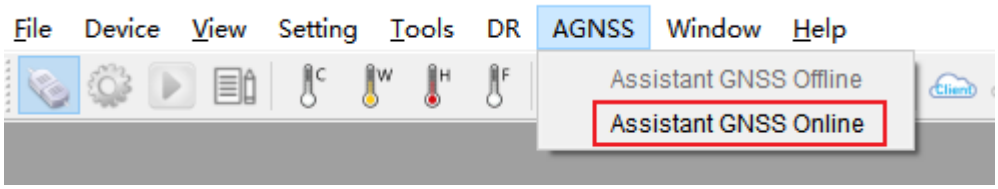


Figure 40: Open AGNSS Window

Step 1 Get AGNSS file:

1. Click "**Connect**" to connect to the FTP server.

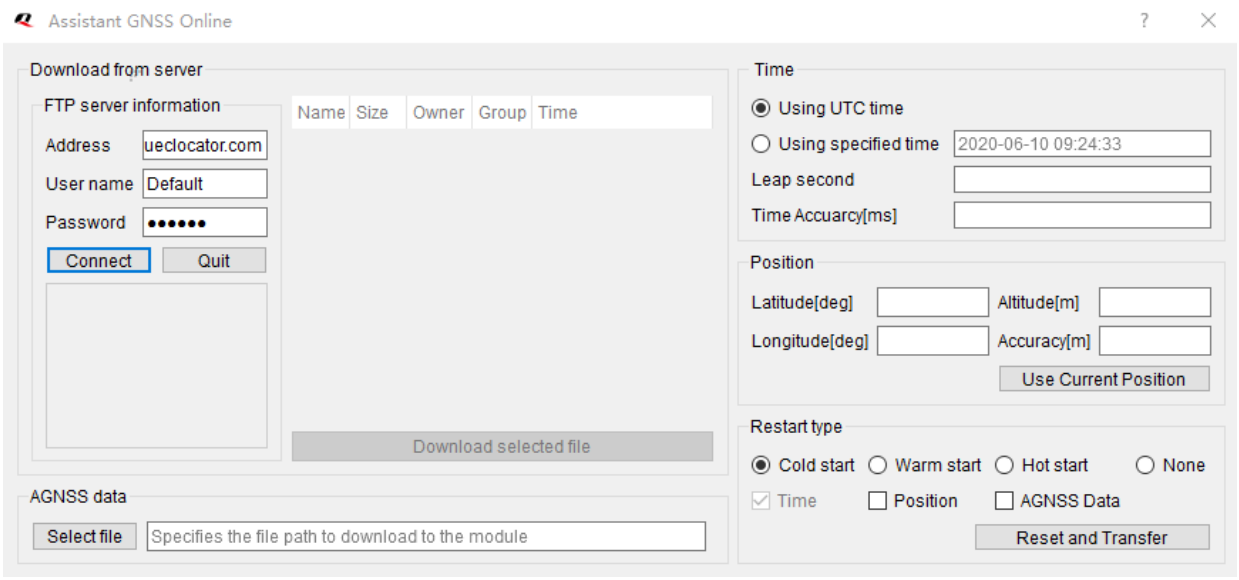


Figure 41: Connect to FTP Server

NOTE

AGNSS file is used to improve the TTFF duration by providing long duration Ephemeris to the receiver.

2. Select the AGNSS file to be downloaded and click "**Download selected file**".

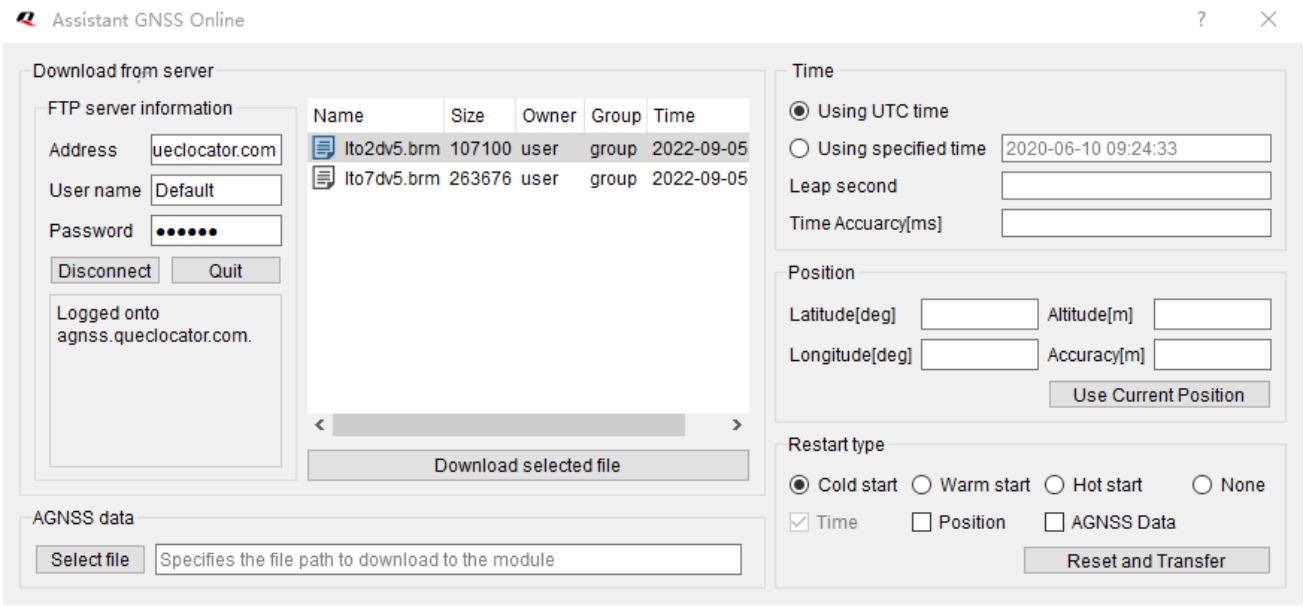


Figure 42: Download AGNSS File

Step 2 Send AGNSS data to the receiver:

1. Click "**Using UTC time**" to use the current time from receiver or click "**Using specified time**" to enter a time information.
2. Enter the position information (Latitude, Altitude, Longitude and Accuracy) or click "**Use Current Position**" to use the current position from receiver.
3. Choose a "**Restart type**".
4. Check "**Position**" and "**AGNSS Data**".
5. Click "**Reset and Transfer**".

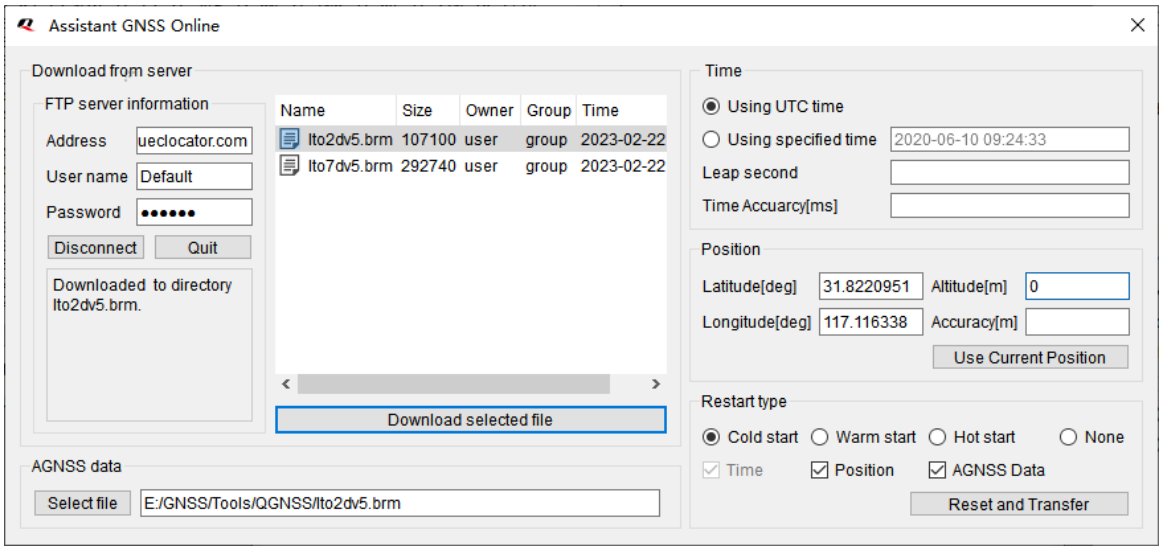


Figure 43: Send AGNSS Data

3.8. NTRIP

The NTRIP is a gateway for GNSS modules to receive RTK corrections, which can effectively improve the positioning accuracy.

Click "**NTRIP Client**" in the "**Tools**" tab drop-down menu to open "**NTRIP Client**" window.

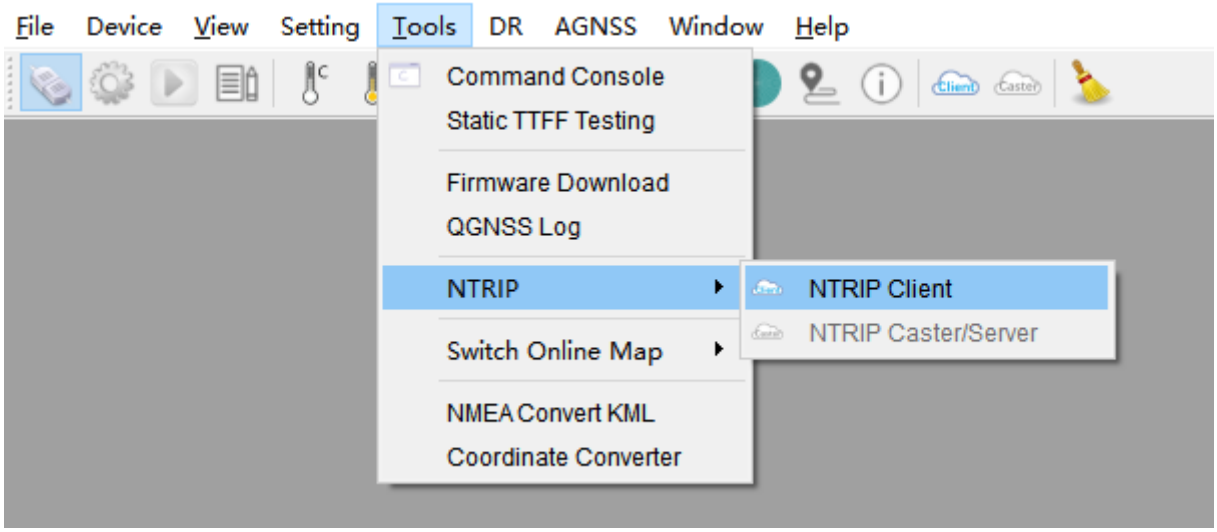


Figure 44: Open NTRIP Client

3.8.1. NTRIP Client

Use an NTRIP (V1.0) Client to connect to a standard NTRIP Caster, and follow these steps:

Step 1 Enter the Address, Port, Username and Password. Contact Quectel Technical Support to get the Username and Password if necessary.

Step 2 Click "**Update NTRIP source table**" and wait for the server to return mount point information.

Step 3 Select "**NTRIP mount point**".

Step 4 Enter "**Request Interval**".

Step 5 Tick the checkbox next to "**Use manual position**" and a window as shown in *Figure 46: Set Manual Position* pops up for entering the relevant data; otherwise the fixed position of the module will be used.

Step 6 Turn on the "**Connect to Host**" switch.

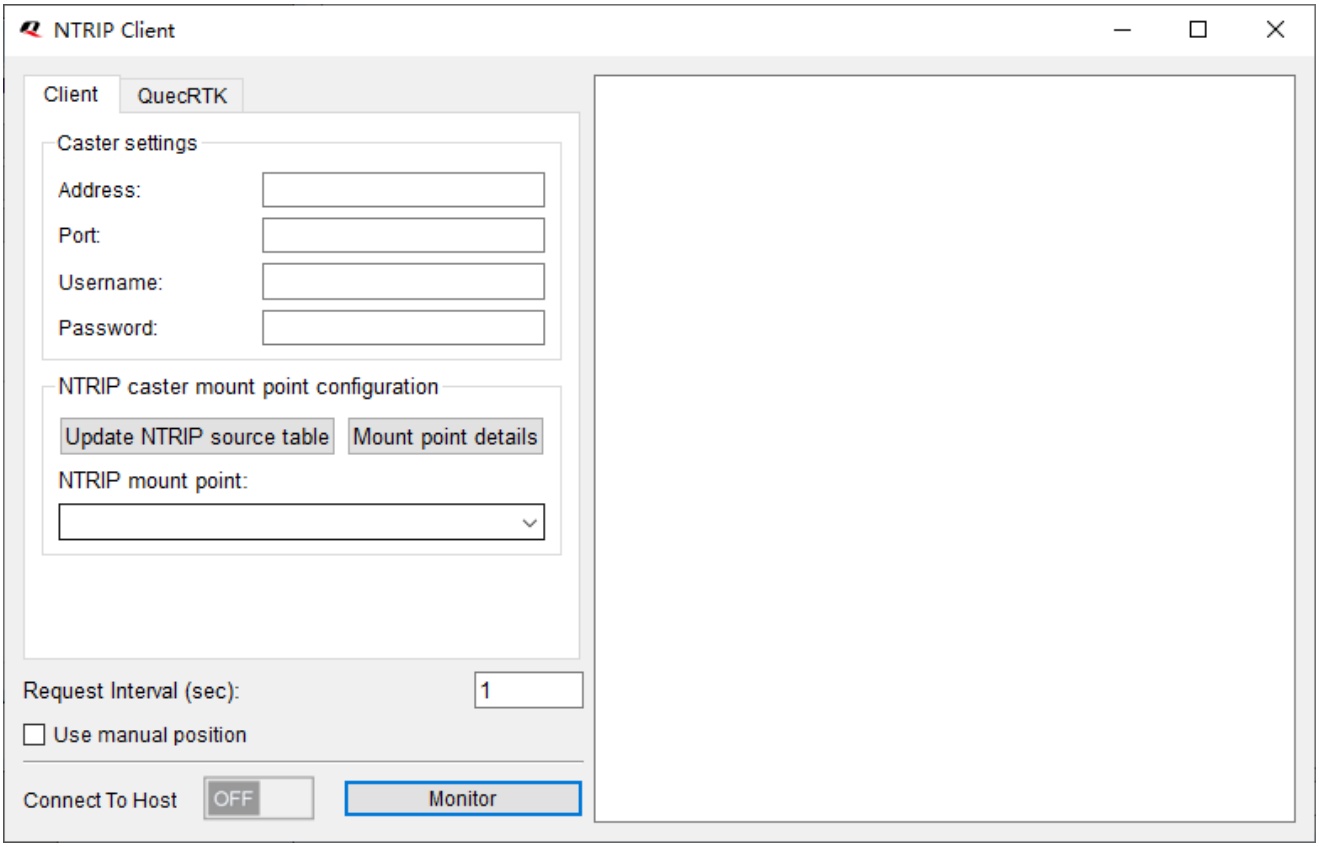


Figure 45: NTRIP Client

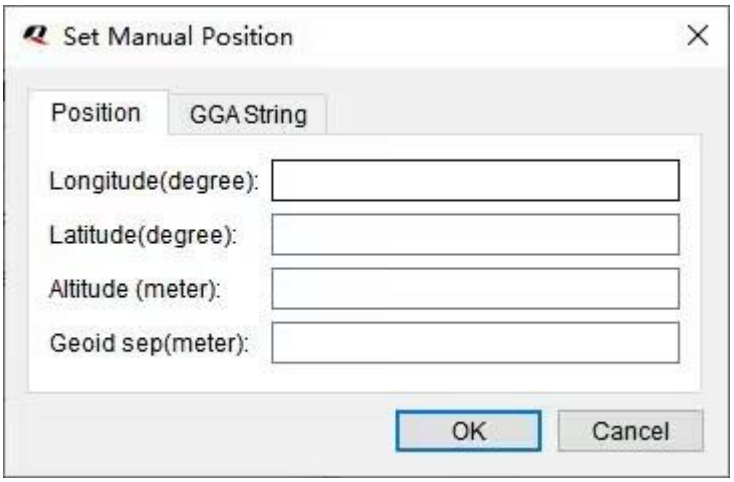


Figure 46: Set Manual Position

3.8.2. QuecRTK Client

QuecRTK is a high-precision RTK positioning and navigation service provided by Quectel, based on network RTK technology and supporting multiple constellations and frequency bands. The positioning accuracy can reach centimeter-level. By following the steps below, use QuecRTK to improve the module's positioning accuracy:

Step 1 Enter the MCC, Company ID, Device ID and Licence Key. Contact Quectel Technical Support to get the Device ID and Licence Key if necessary.

Step 2 Enter "**Request Interval**".

Step 3 Tick the checkbox next to "**Use manual position**" and a window as shown in *Figure 46: Set Manual Position* pops up for entering the relevant data; otherwise the fixed position of the module will be used.

Step 4 Turn on the "**Connect to Host**" switch.

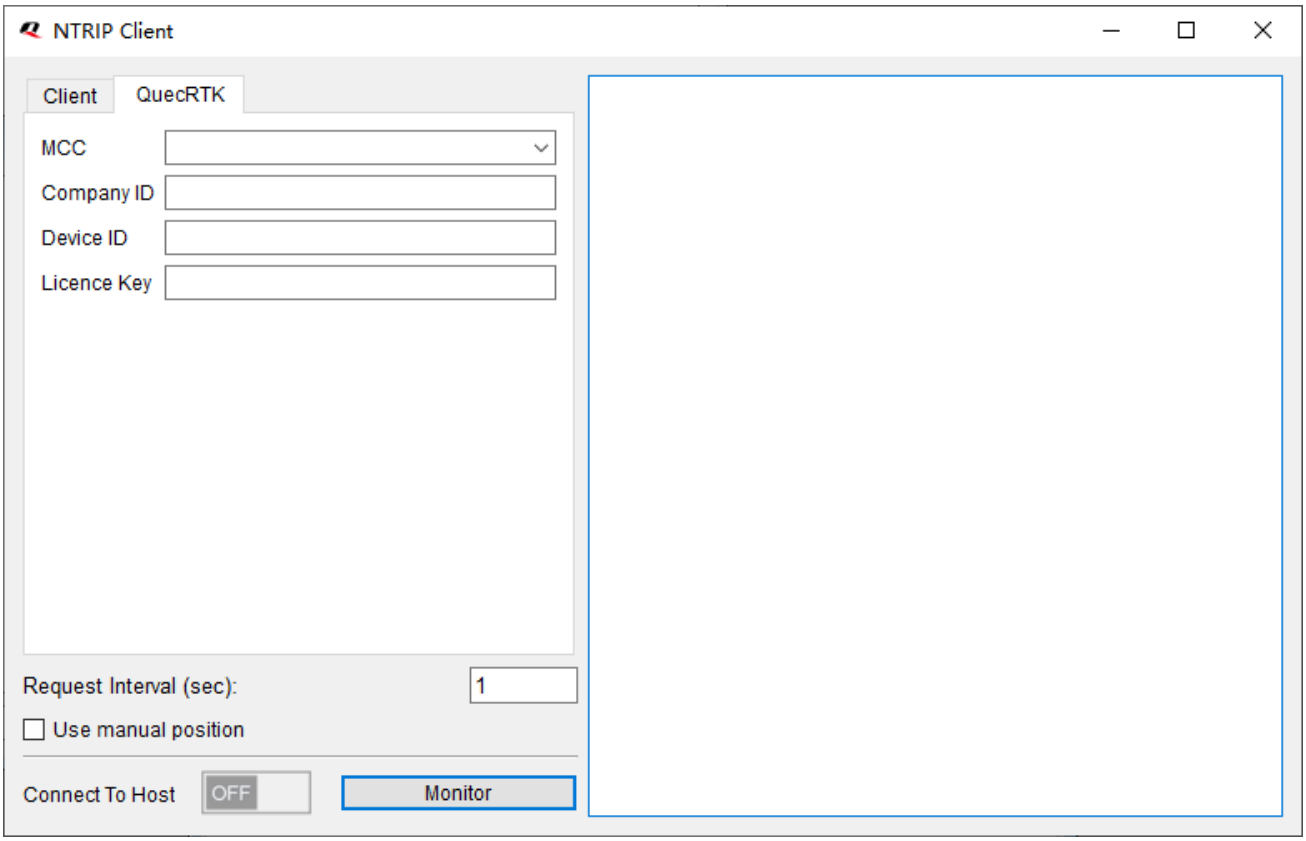


Figure 47: QuecRTK Client

3.8.3. Data Monitor

Click “**Monitor**” to open the Data Monitor dialog box where you can view the differential correction data sent by the server.

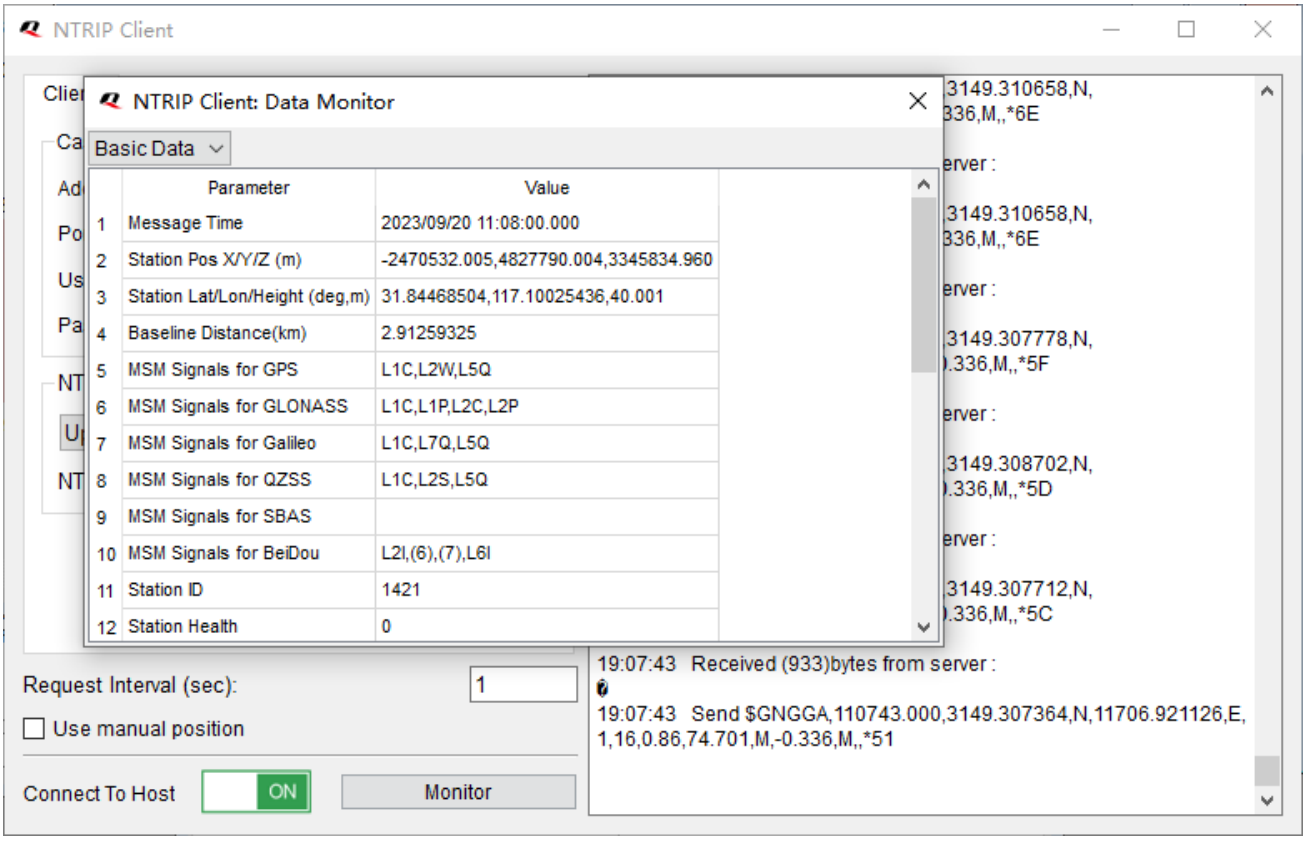


Figure 48: RTK Data Monitor

3.9. Firmware Download

Connect to the receiver as explained in *Chapter 3.1 Connect to Receiver*. Click "**Firmware Download**" in the "**Tools**" tab drop-down menu to open "**Firmware Download**" window.

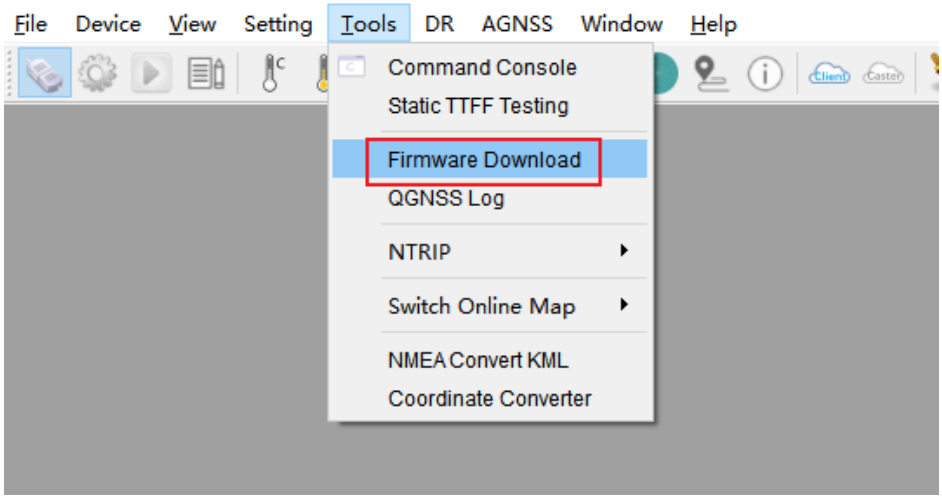


Figure 49: Open Firmware Download

Step 1 Click to select the receiver firmware.

Step 2 Click to start the firmware download process and wait for the process to complete.

Step 3 Reset module.

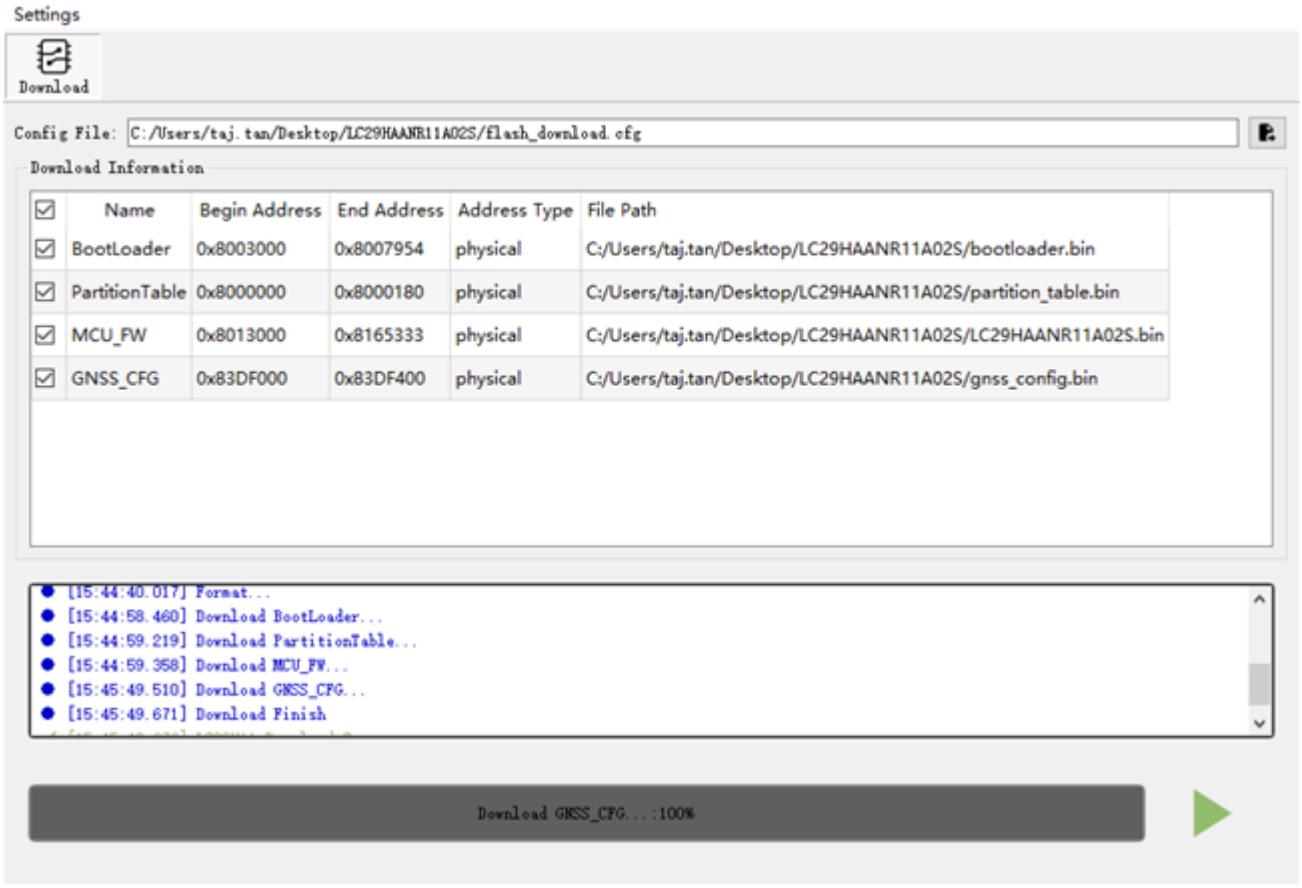


Figure 50: Firmware Download Process

NOTE

The steps for downloading the firmware by QGNSS tool may vary from module to module. See firmware upgrade guide document of specific module for details.

4 Appendix References

Table 6: Terms and Abbreviations

Abbreviation	Description
AGNSS	Assisted GNSS
BDS	BDS Navigation Satellite System
C/N_0	Carrier-to-Noise-Density Ratio
CEP	Circular Error Probable
DR	Dead Reckoning
EPH	Ellipsoid Height
GLONASS	GLONASS Navigation Satellite System
GPS	Global Positioning System
IRNSS	Indian Regional Navigation Satellite System (NavIC)
KML	Keyhole Markup Language
MSL	Mean Sea Level
NTRIP	Networked Transport of RTCM via Internet Protocol
PRN	Pseudo Random Noise Code
QZSS	Quasi-Zenith Satellite System
RTK	Real-time Kinematic
SBAS	Satellite-Based Augmentation System
TTFF	Time to First Fix
QuecRTK	Quectel RTK