

QGNSS User Guide

GNSS Module Series

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Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

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2.1	2023-10-16	<ol style="list-style-type: none"> Updated the tool version to V1.9. Added QuecRTK function (Chapter 1). Updated Deviation Map and related icons to show more detailed positioning information (Chapter 2.2.3.5). Added the “Calculation Distance” tool in the coordinate converter window (Chapter 2.2.5.3). Added QuecRTK Client and Data Monitor pages (Chapters 3.8.2 and 3.8.3). Added the figure of firmware download process (Figure 50).
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3.2	2025-07-01	1. Updated the tool version to V2.2. 2. Added descriptions of “Raw Data”, “Binary Data” and “Text Data” sub-windows (Chapters 2.2.3.1 , 2.2.3.2 and 2.2.3.3). 3. Added descriptions of “GNSS Coordinate Transformation” sub-Window (Chapter 2.2.5.2). 4. Added descriptions of “Error Messages” (Chapter 2.2.5.6).

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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, Server and Caster.
- Supports the downloading of firmware update packet to GNSS modules.

2 User Interface Description

2.1. Main Window

The figure illustrated below is the initial window of QGNSS.

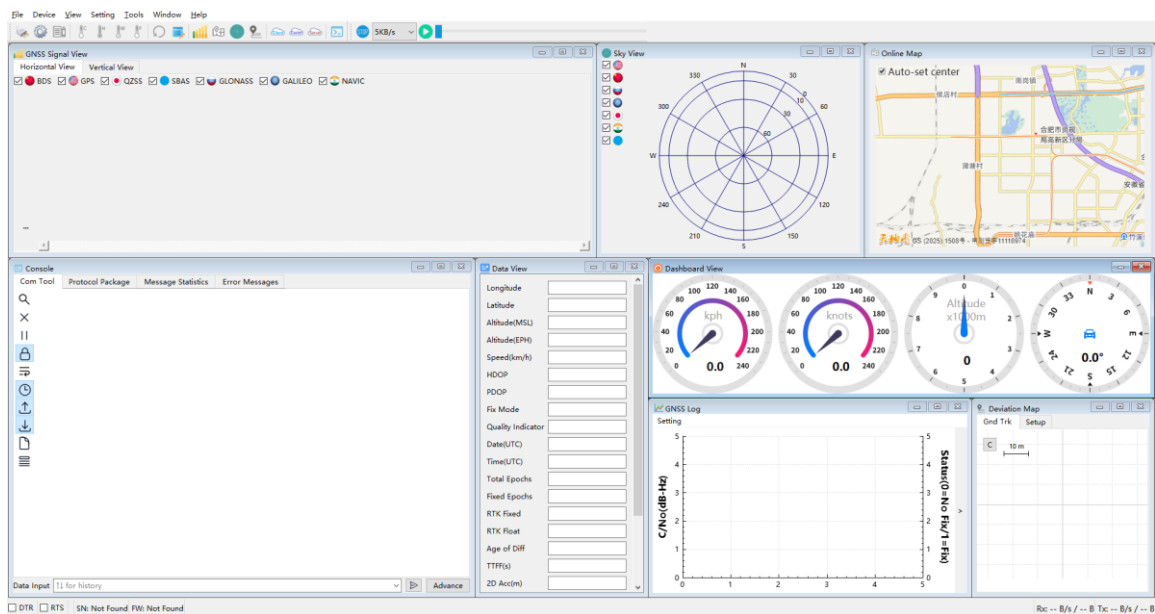


Figure 1: Main Window

2.2. Menu Bar

2.2.1. File Tab

In the “File” tab menu: Click “Quit” to close QGNSS.

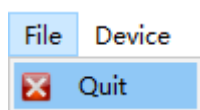


Figure 2: File Tab

2.2.2. Device Tab

In the “**Device**” tab menu:

- Click “**Connect**” to connect to the receiver.
- Click “**Device Info**” to configure serial port information. See [Chapter 3.1 Connect to Receiver](#) for details.

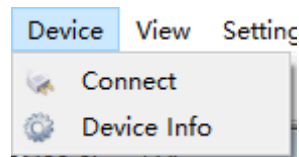


Figure 3: Device Tab

NOTE

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

2.2.3. View Tab

The main function of all sub-windows under “**View**” is to display key data.

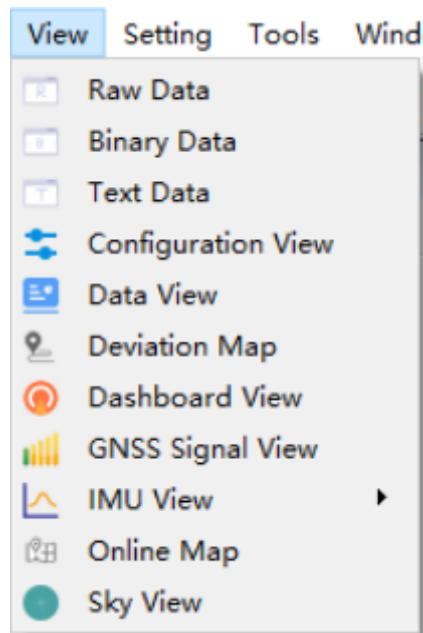


Figure 4: View Tab

2.2.3.1. Raw Data Sub-Window

The “**Raw Data**” sub-window displays all data sent by the receiver. There are “**Clear**”, “**Timestamp**”, “**Pause**” button, and “**Filter**” at the bottom of the window.

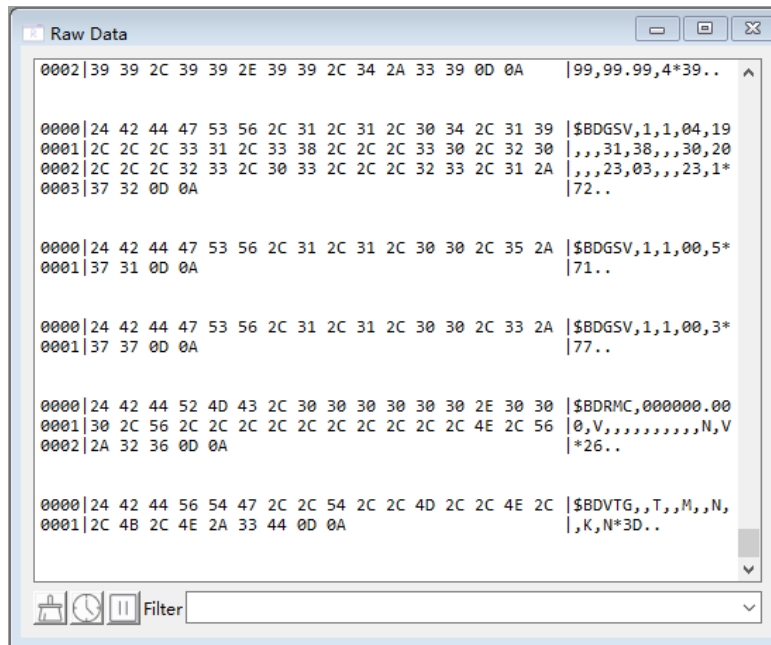


Figure 5: Raw Data Sub-Window

2.2.3.2. Binary Data Sub-Window

The “**Binary Data**” sub-window displays the message of the binary protocol. There are “**Clear**”, “**Timestamp**”, “**Pause**” button and “**Filter**” at the bottom of the window.

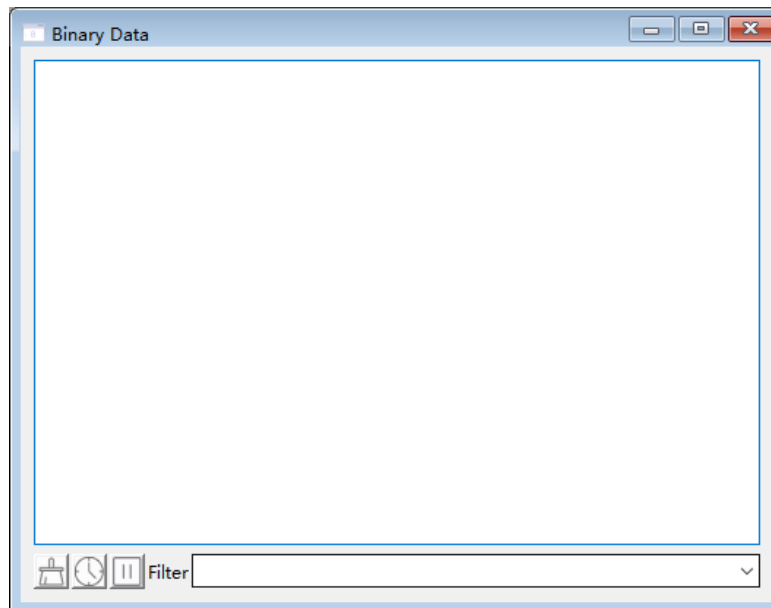


Figure 6: Binary Data Sub-Window

2.2.3.3. Text Data Sub-Window

The “**Text Data**” sub-window displays validated NMEA messages. There are “**Clear**”, “**Timestamp**”, “**Pause**” button and “**Filter**” at the bottom of the window.

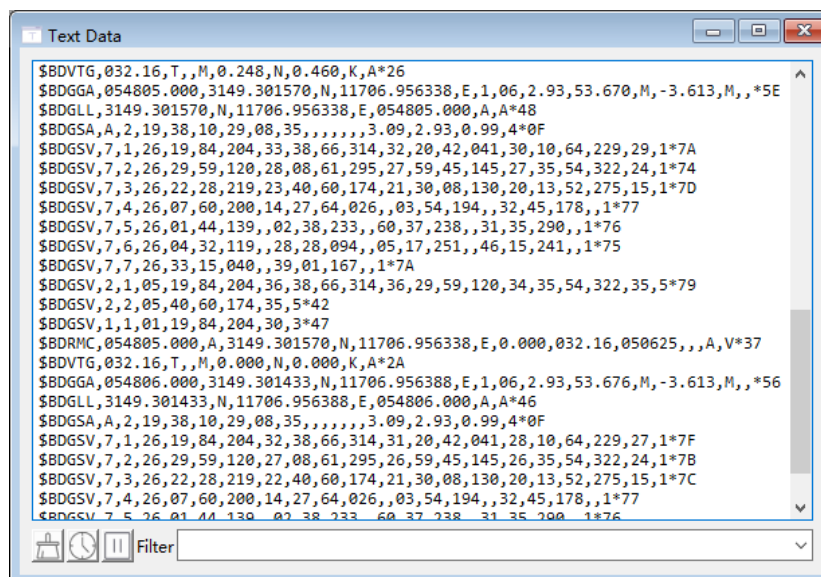


Figure 7: Text Data Sub-Window

2.2.3.4. Configuration View Sub-Window

The “**Configuration View**” sub-window is used to modify the receiver configuration. The configuration parameters may change depending on module type. “**Query**” button is used for querying commands in the current page. “**Setting**” button is used for generating commands and sending them to the GNSS module.

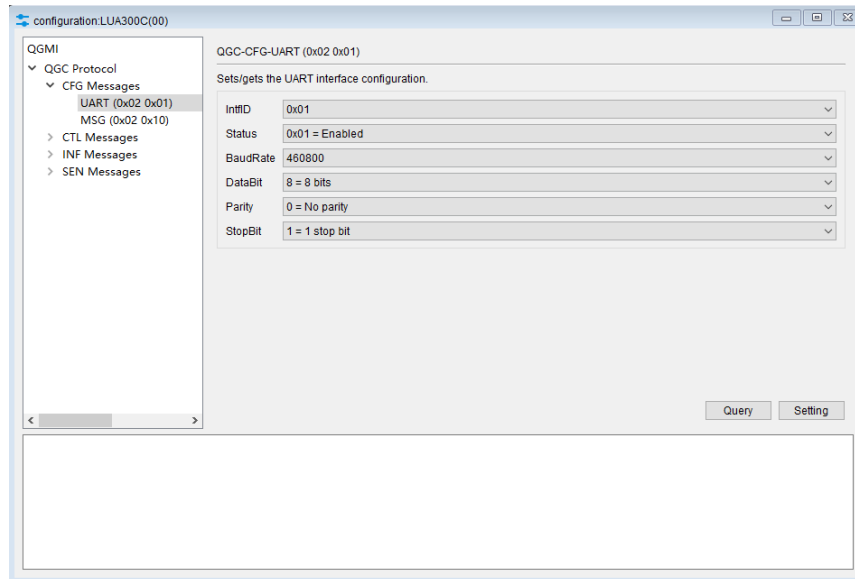
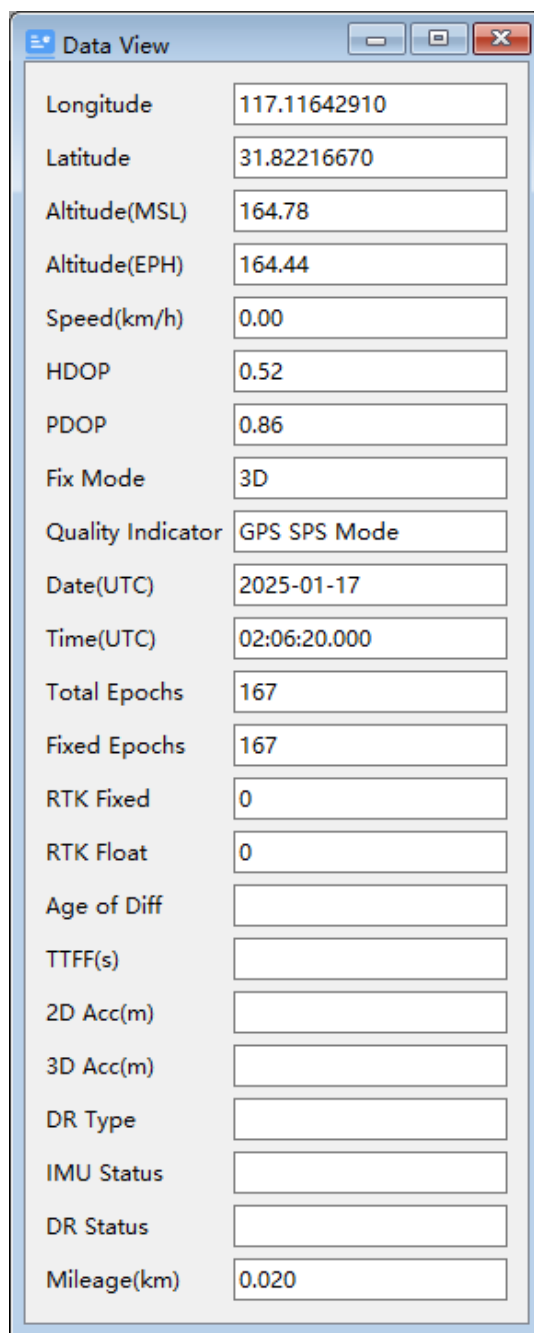


Figure 8: Configuration View Sub-Window

2.2.3.5. Data View Sub-Window


The “**Data View**” sub-window displays the data information, such as longitude, latitude, altitude, fix mode and mileage.



Data View	
Longitude	117.11642910
Latitude	31.82216670
Altitude(MSL)	164.78
Altitude(EPH)	164.44
Speed(km/h)	0.00
HDOP	0.52
PDOP	0.86
Fix Mode	3D
Quality Indicator	GPS SPS Mode
Date(UTC)	2025-01-17
Time(UTC)	02:06:20.000
Total Epochs	167
Fixed Epochs	167
RTK Fixed	0
RTK Float	0
Age of Diff	
TTFF(s)	
2D Acc(m)	
3D Acc(m)	
DR Type	
IMU Status	
DR Status	
Mileage(km)	0.020

Figure 9: Data View Sub-Window

2.2.3.6. Deviation Map Sub-Window

The “**Deviation Map**” sub-window displays positions in longitude and latitude relative to the initial positioning point and show CEP circle. CEP (Circular Error Probable) is a metric used to measure the positioning accuracy. It uses a circle, centered on the reference point, to represent the distribution of positioning errors. Left click the  to display the CEP circle, as shown in [Figure 11: Deviation Map Sub-Window – CEP](#).

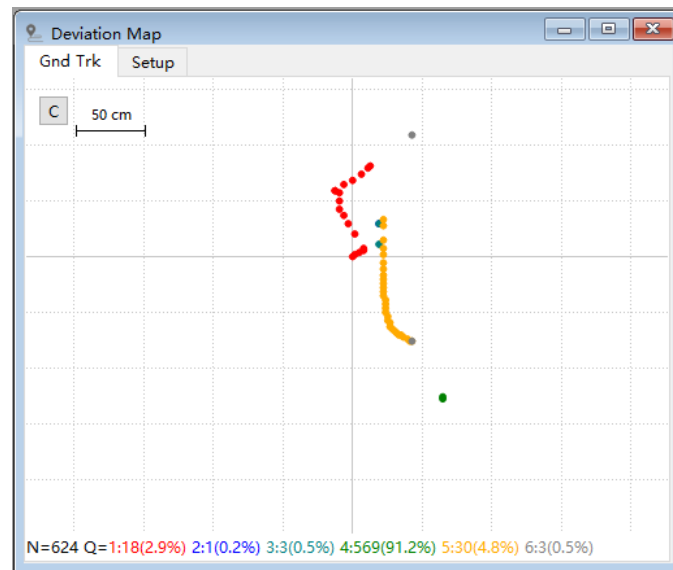


Figure 10: Deviation Map Sub-Window – Gnd Trk

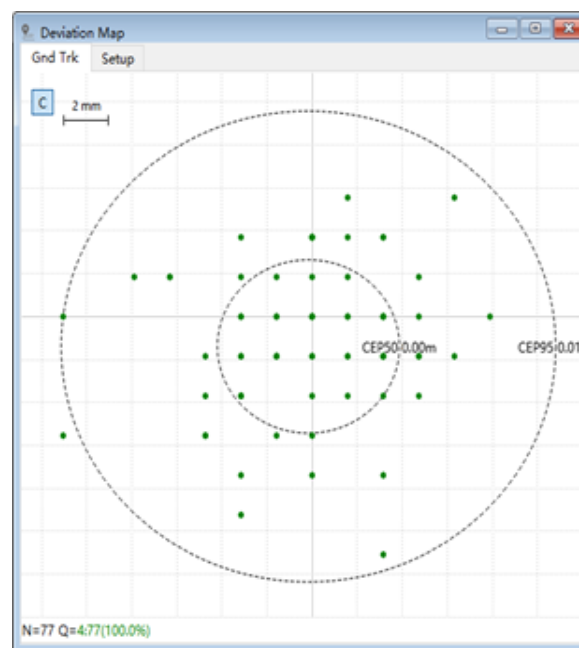



Figure 11: Deviation Map Sub-Window – CEP

The detailed functions of “**Gnd Trk**” page in “**Deviation Map**” sub-window are listed below:

Table 1: Deviation Map Function Description

Icon	Description
	Click the icon to display CEP circle

Icon	Description
N=624	Total points
1:18(2.9%)	GPS SPS Mode: 18 points in total (accounting for 2.9 % of the total points)
2:1(0.2%)	Differential GPS, SPS Mode or SBAS Mode: 1 point in total (accounting for 0.2 % of the total points)
3:3(0.5%)	GPS PPS Mode: 3 points in total (accounting for 0.5 % of the total points)
4:569(91.2%)	Fixed RTK Mode: 569 points in total (accounting for 91.2 % of the total points)
5:30(4.8%)	Float RTK Mode: 30 points in total (accounting for 4.8 % of the total points)
6:3(0.5%)	Estimated (dead reckoning) Mode: 3 points in total (accounting for 0.5 % of the total points)

The “**Setup**” page enables you to specify the reference point type. Choosing “**Average**” under “**Reference point**” will automatically populate the longitude, latitude and altitude fields with their average values. On the other hand, selecting “**User**”, you will need to manually input the respective longitude, latitude and altitude values.

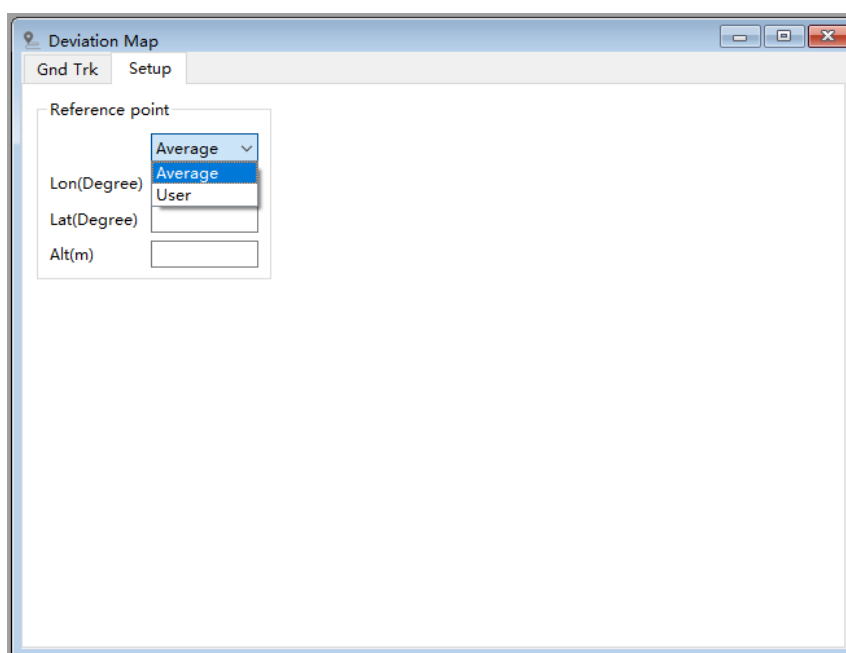


Figure 12: Deviation Map Sub-Window – Setup

NOTE

1. Use the mouse scroll wheel to zoom in/out on the “**Deviation Map**” and hold down the left mouse button to drag the “**Deviation Map**”. Right click the mouse button to clear the points on the “**Deviation Map**”.

2. The color of the points in the deviation map are determined by the different values of **<Quality>** field in the **GGA** message.

2.2.3.7. Dashboard View Sub-Window

The “**Dashboard View**” sub-window is composed of four instrument panels, speed instrument panel, knots indicator, altitude instrument panel and heading instrument panel, which displays relevant data in the NMEA protocol.

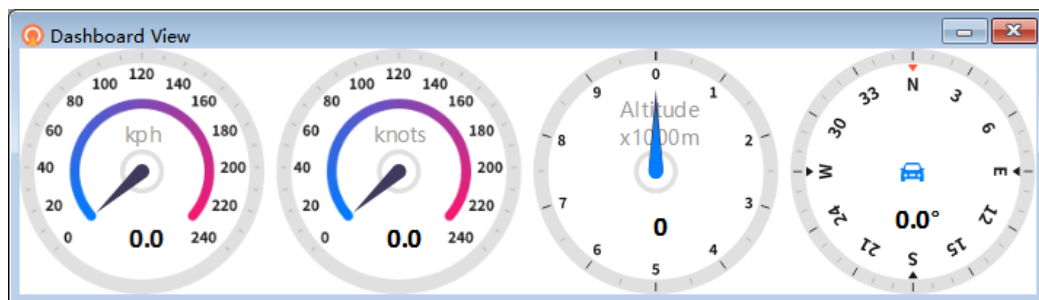


Figure 13: Dashboard View Sub-Window

2.2.3.8. GNSS Signal View Sub-Window

The sub-window in the figure below (“**GNSS Signal View**”) contains “**Horizontal View**” and “**Vertical View**”.

1. Horizontal View Introduction

“**Horizontal View**” 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 and therefore there is no data available in NMEA **GSA** messages.

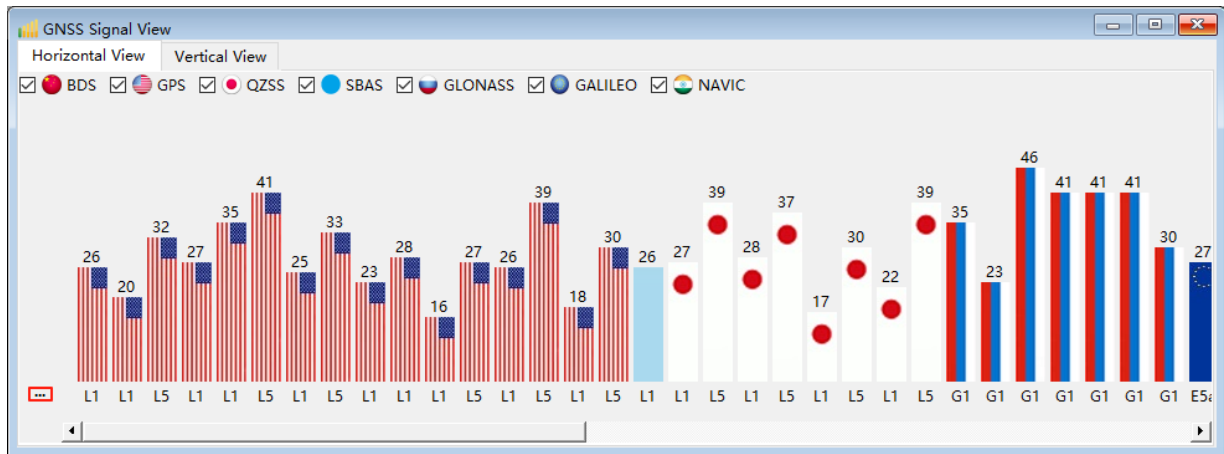


Figure 14: GNSS Signal View Sub-Window – Horizontal View

Click “...” to display the detailed information and click **Band** to hide the detailed information.

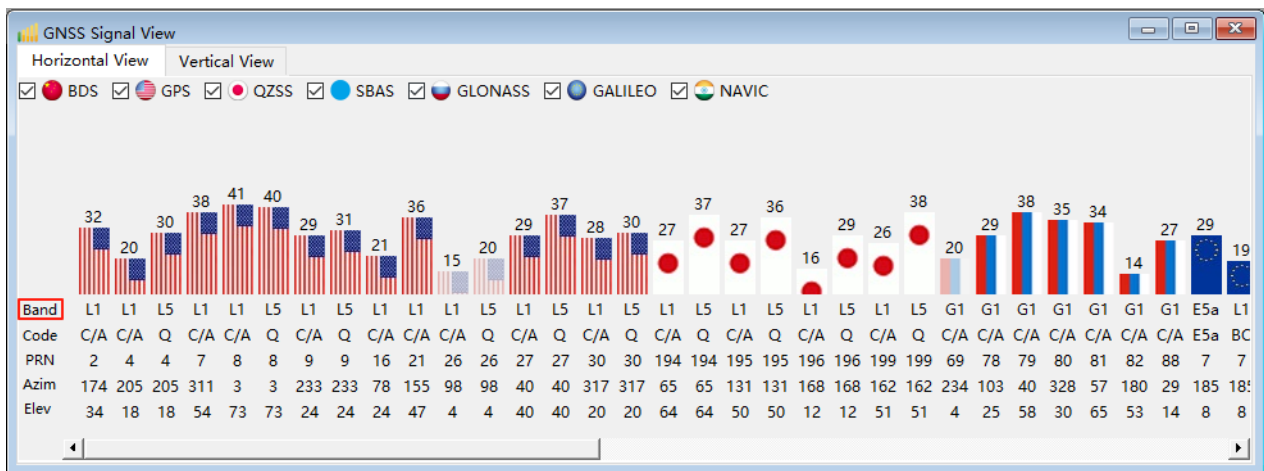


Figure 15: Horizontal View Detailed Information

Table 2: GNSS Signal View Function Description

Button	Description
Band	Satellite frequency band.
Code	Sent by a satellite for ranging and satellite acquisition.
PRN	Pseudo Random Noise Code.
Azim	Satellite azimuth in degrees.
Elev	Satellite elevation in degrees.

2. Vertical View Introduction

Click “**Vertical View**” to open the vertical satellite signal-to-noise ratio chart, which allows for a more intuitive comparison of the trends of satellite values among different constellations.

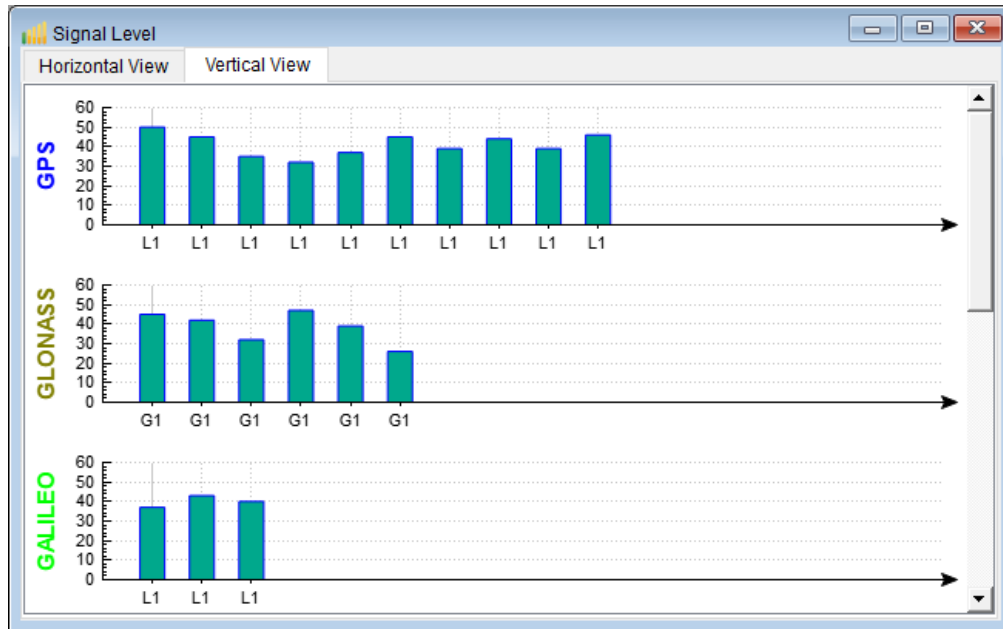


Figure 16: GNSS Signal View Sub-Window – Vertical View

2.2.3.9. IMU View Sub-Window

The “**IMU View**” is composed of three curve charts, “**IMU Output View**”, “**IMU1 Raw Data**” and “**IMU2 Raw Data**”, for a more intuitive display of the real-time data fluctuations. The presentation of those three curves is the same, yet the data sources are different. The “**IMU Output View**” is derived from calibrated IMU data, and the data sources for “**IMU1 Raw Data**” and “**IMU2 Raw Data**” are IMU1 raw data and IMU2 raw data. By checking or unchecking the relevant checkbox, those curves can be displayed or hidden.

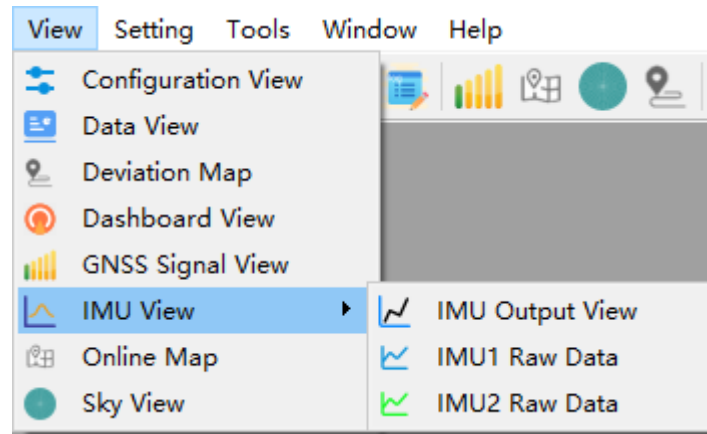


Figure 17: IMU View Drop-down Menu

“**IMU Output View**” sub-window displays three-axis acceleration (ACC_X, ACC_Y, ACC_Z), three-axis angular rate (GYO_X, GYO_Y, GYO_Z), and Temperature, as well as the extreme and average values of these seven data in the form of curve charts. In addition, it also contains some user-friendly settings.



Figure 18: IMU View Sub-Window

The details on “**IMU Output View**” are listed below:

- **Data Point:** Range of a single curve in the curve chart, which can be set to 100, 300, 500, 1000, 2000 or 3000.
- **Reset Zoom:** Curve state restoration button. After clicking the button, the curve will be restored to its original state.

- **Pause/Running Chart:** Stop refreshing curve/refresh curve button.
 - After clicking “**Pause Chart**”, the button changes to “**Running Chart**”. At this time, the curve stops refreshing and interactive operations of the curve can be performed on the chart, such as viewing detailed data of a single point, moving and scaling the curve.
 - After clicking “**Running Chart**”, the button changes to “**Pause Chart**”. At this time, the curve is refreshing and the interactive operations of the curve is disabled.
- **Minimum:** Minimum value within the “**Data Point**” range.
- **Average:** Average value within the “**Data Point**” range.
- **Maximum:** Maximum value within the “**Data Point**” range.
- **Stdev:** Standard deviation within the “**Data Point**” range.

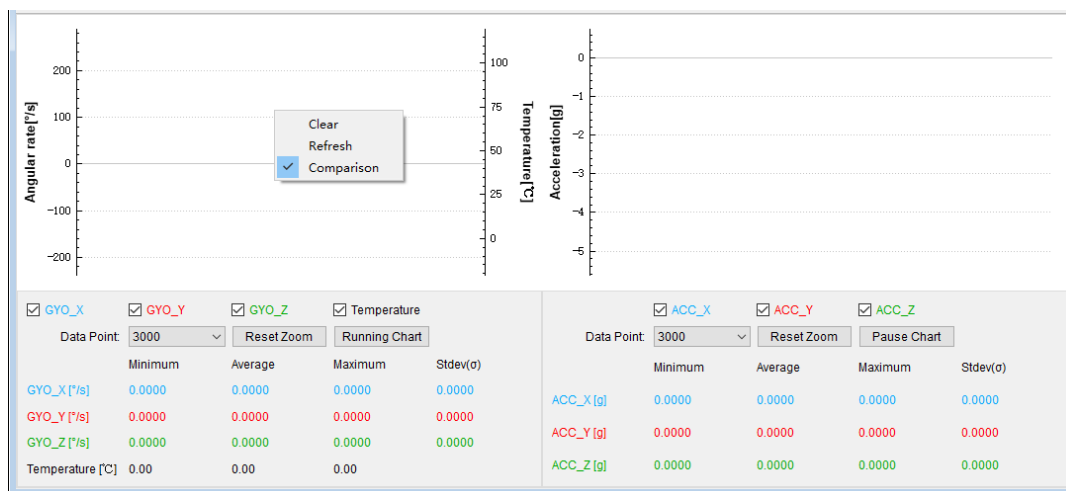


Figure 19: IMU Curve Menu

Comparison	
GYO_X	, Unix: 25133, UTC: 08:00:25.133, V: -0.1057
GYO_Y	, Unix: 25133, UTC: 08:00:25.133, V: -0.4818
GYO_Z	, Unix: 25133, UTC: 08:00:25.133, V: 0.7711
Temperature	, Unix: 25133, UTC: 08:00:25.133, V: 27.83

Figure 20: IMU Comparison

Right click the mouse to open the curve menu, the details are as follows:

- **Clear:** Clear all current data of the curve chart.
- **Refresh:** The function is the same as “**Reset Zoom**”.
- **Comparison:** Check to open the point comparison view to show data points on the Y-axis that corresponds to the points on the X-axis. Parameters, taking data in the first row of [Figure 20: IMU Comparison](#) as an example, are explained as follows:
 - **GYO_X:** Curve name
 - **Unix:** Unix time, Unit: Second

- **UTC:** UTC time
- **V:** Data points on the Y-axis that corresponds to the points on the X-axis

NOTE

If the IMU time is not synchronized with the time of GNSS module, Unix time and UTC time will be converted according to the IMU time instead of the actual time.

2.2.3.10. Online Map Sub-Window

The “**Online Map**” displays real-time location reported by the module on a map.

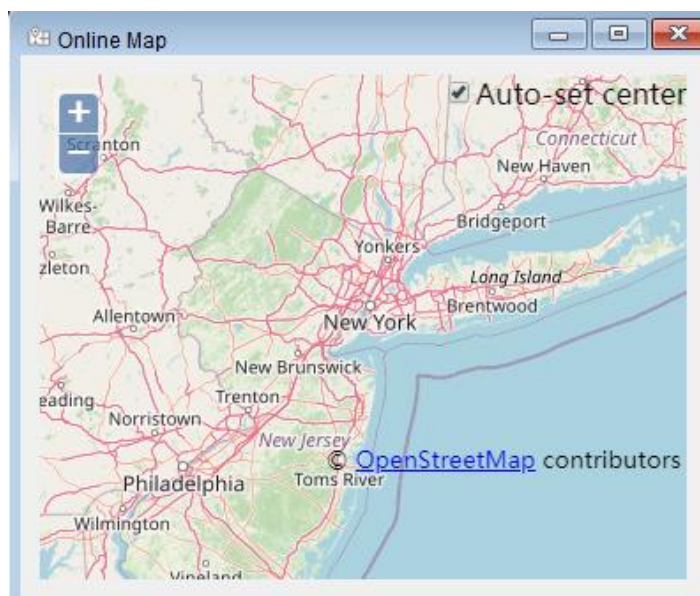


Figure 21: Online Map Sub-Window

2.2.3.11. 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.

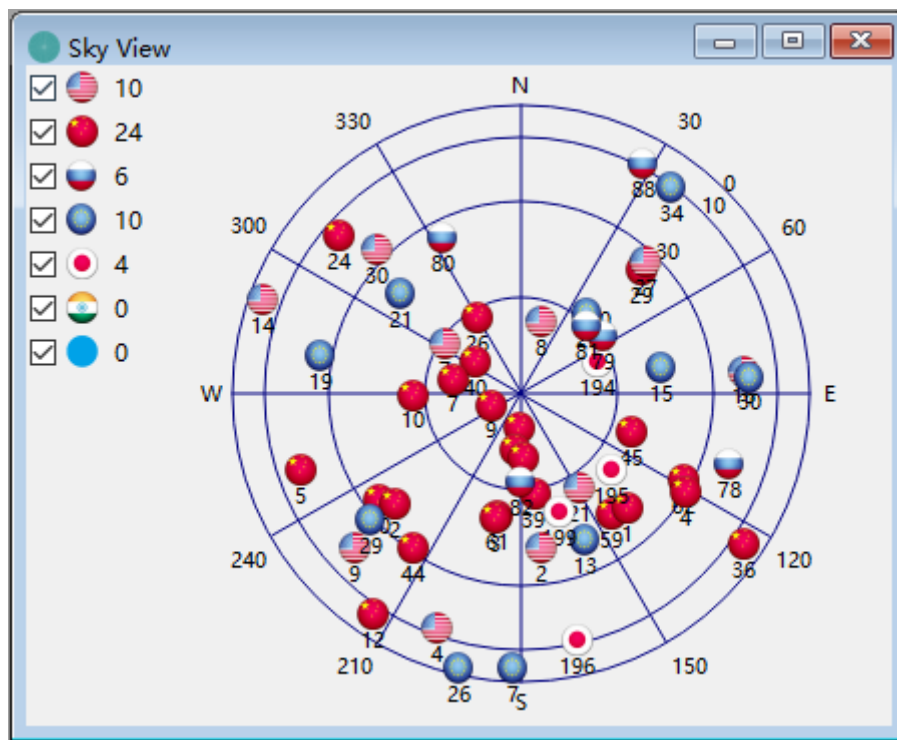


Figure 22: Sky View Sub-Window

2.2.4. Setting Tab

Click **“Preferences”** in the dropdown menu of **“Setting”** to enter the **“Preferences”** sub-window and set the supported protocol to parse in the **“Preferences”** sub-window.

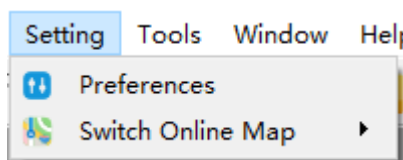


Figure 23: Setting Tab

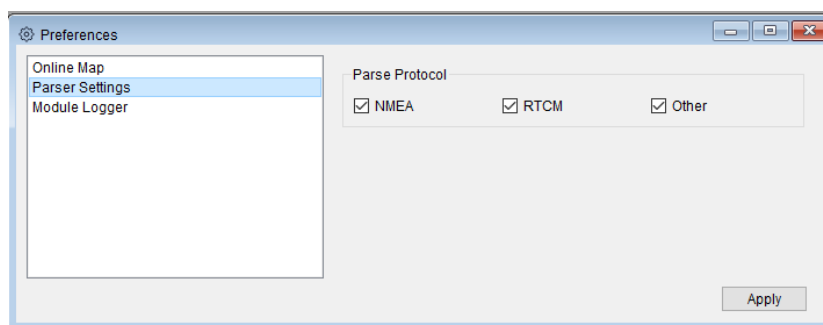


Figure 24: Preferences Sub-Window

You can switch between the online maps supported by the QGNSS (“TianDiMap” and “OpenStreetMap”) via “**Switch Online Map**” dropdown menu.

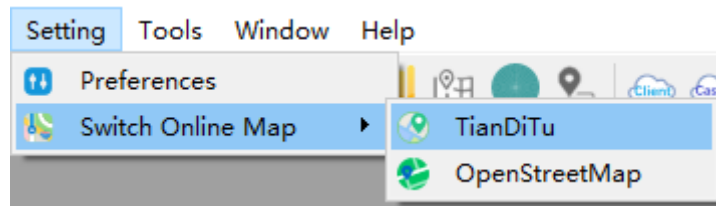


Figure 25: Switch Online Map

2.2.5. Tools Tab

The sub-windows in the “**Tools**” tab are illustrated below:

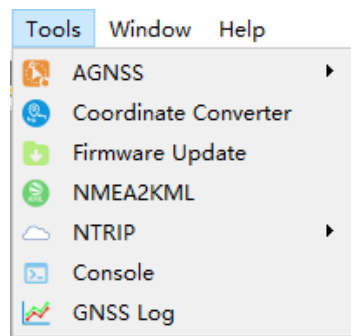


Figure 26: Tools Tab

2.2.5.1. AGNSS Sub-Window

Assisted Global Navigation Satellite System (AGNSS) represents a sophisticated enhancement to conventional GNSS technology, specifically engineered to address its limitations. Typically, GNSS receivers experience extended first-time-to-fix (TTFF) durations, often reaching several tens of seconds post-startup, a process known as cold start, due to the limited speed at which satellites transmit navigation information. This delay is exacerbated in signal challenge environment. AGNSS technology mitigates this issue by facilitating the acquisition of assistance data via network. The assistance data encompasses ephemeris, almanac, accurate time and approximate position. Leveraging this data, AGNSS empowers receivers to swiftly calculate accurate positions within a few seconds, even under weak signal conditions.

The QGNSS tool incorporates an AGNSS feature that enables the downloading of AGNSS data files from FTP server using two distinct approaches: “**Online AGNSS**” and “**Offline AGNSS**” data downloading.

See [Chapter 0](#)

[Download AGNSS Data from](#) Server for details.

2.2.5.2. Coordinate Converter Sub-Window

1. In the “Coordinate Converter” Sub-Window:

- Select one of the “LLA(Deg)”, “LLA(Deg,Min)”, “LLA(Deg,Min,Sec)”, or “ECEF(XYZ)” coordinate system formats, taking “LLA(Deg)” as an example:

The screenshot shows the "Coordinate Converter" window with three tabs: "Coordinate Converter", "Finding Coordinate Distance", and "GNSS Coordinate Transformation". The "Coordinate Converter" tab is active. It features four radio buttons for selecting a coordinate system: "LLA (Deg)" (selected), "LLA(Deg,Min)", "LLA(Deg,Min,Sec)", and "ECEF(XYZ)". Below the "LLA (Deg)" section, there are three input fields: "Lat(D)" with the value "31.82211868", "Lon(D)" with the value "117.11618303", and "Alt(m)" with the value "129.40". Below these are sections for "LLA (Deg,Min)" and "LLA (Deg,Min,Sec)", each with fields for degrees, minutes, and seconds. At the bottom, there is an "ECEF(XYZ)[Unit:m]" section with fields for X, Y, and Z. "Clear" and "Convert" buttons are located at the bottom right of the window.

Figure 27: Coordinate Converter Sub-Window – Enter Values

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

Figure 28: Coordinate Converter Sub-Window – Convert Values

2. In the “**Finding Coordinate Distance**” Sub-Window:

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

Figure 29: Finding Coordinate Distance Sub-Window

3. In the “**GNSS Coordinate Transformation**” Sub-Window:
 - Directly copy and paste the GNSS output coordinates (in DDMM.MMMMMM format) into the corresponding field to convert them to BD09, GCJ02, and Decimal Degree formats.

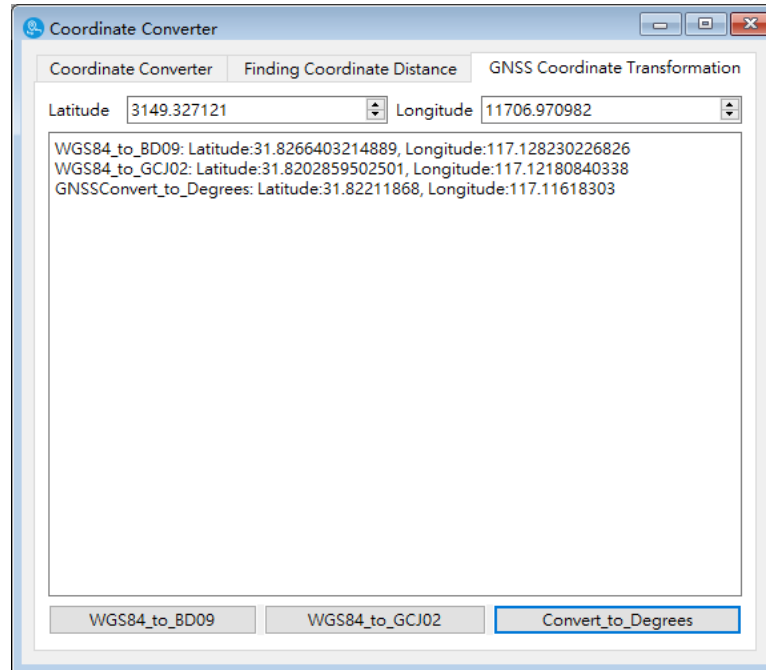


Figure 30: GNSS Coordinate Transformation Sub-Window

2.2.5.3. Firmware Update Sub-Window

The “**Firmware Update**” sub-window is used to upgrade the module firmware. See [Chapter 3.8 Firmware Update](#) for the general process of firmware upgrade. If the detailed process of firmware upgrade via QGNSS for a specified module is required, please refer to the corresponding firmware upgrade guide.

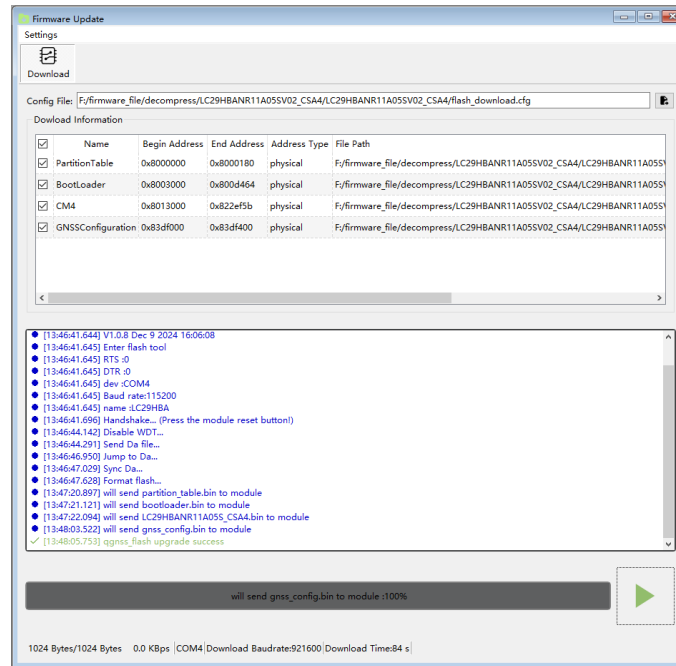


Figure 31: Firmware Update Sub-Window

2.2.5.4. NMEA2KML Sub-Window

The “NMEA2KML” sub-window is used to convert the NMEA log to a KML format file.

- Click “Add NMEA” to select the NMEA file to be converted in the pop-up window.
- Click “Color” drop-down box to select the color of a point.
- Click “Generate” to convert the NMEA log to a KML format file.

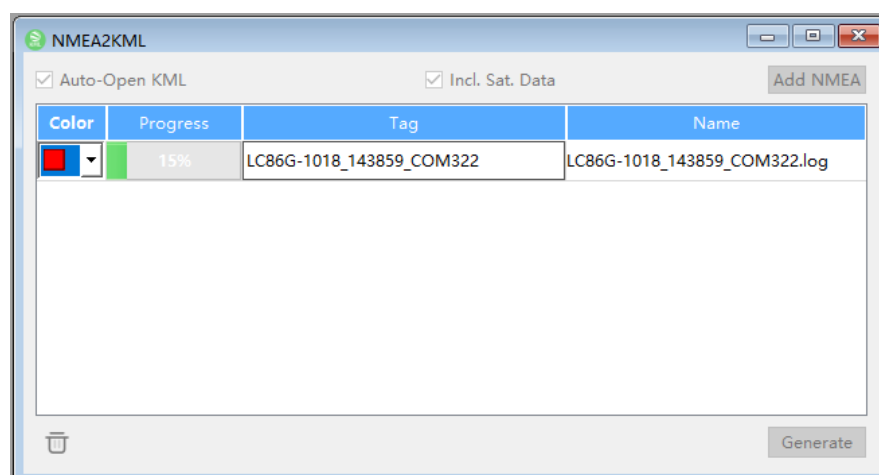


Figure 32: NMEA2KML Sub-Window

NOTE

1. After checking "Auto-Open KML" the generated KML file can be directly opened with Google Earth.exe on your computer.
2. After checking "Incl.Sat.Data," satellite data will be displayed at points in Google Earth.

2.2.5.5. NTRIP Sub-Window

See [Chapter 3.7 Build NTRIP System](#) for details.

2.2.5.6. Console Sub-Window

“Console” is a multi-functional sub-window that integrates “Com Tool”, “Protocol Package”, “Message Statistics”, “Error Messages” and “Data Input”.

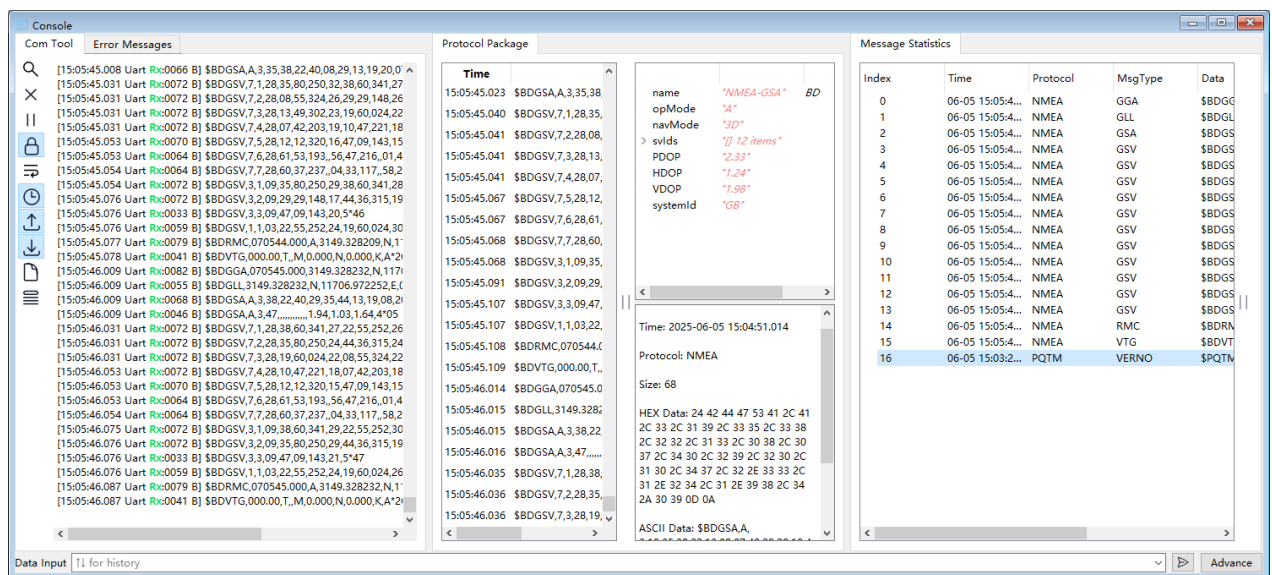


Figure 33: Console Sub-Window

1. Com Tool Introduction

The “**Com Tool**” is a debugging window for the module’s raw data. Right-click the mouse to pop up the context menu.

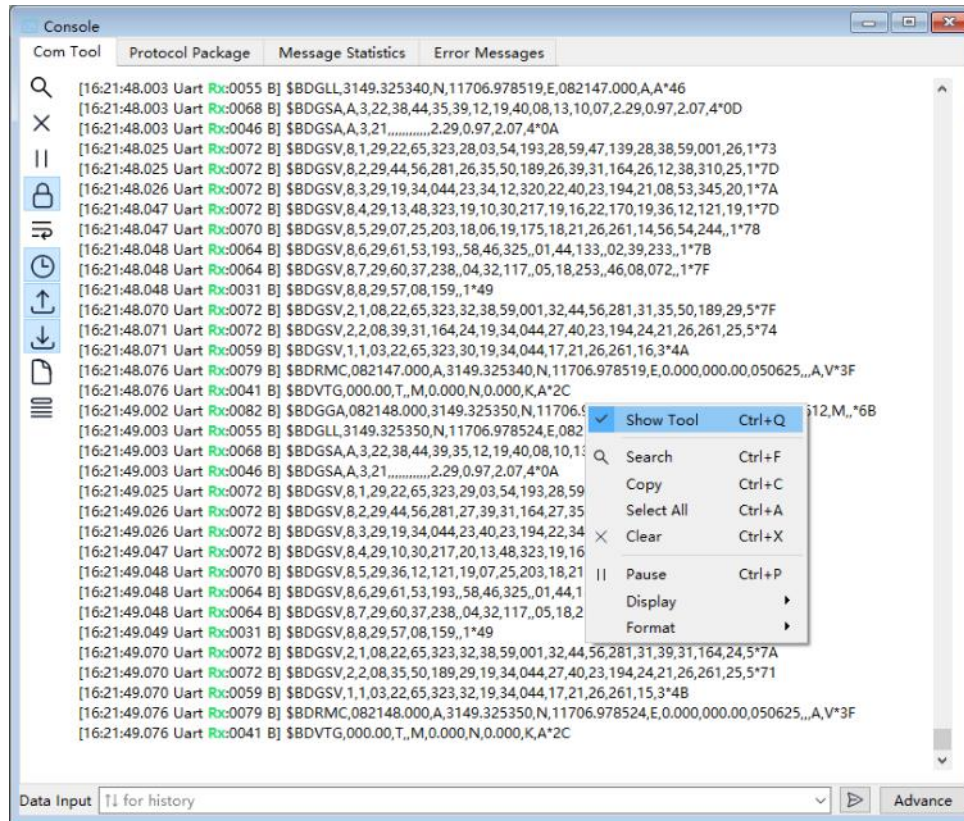


Figure 34: Com Tool Context Menu

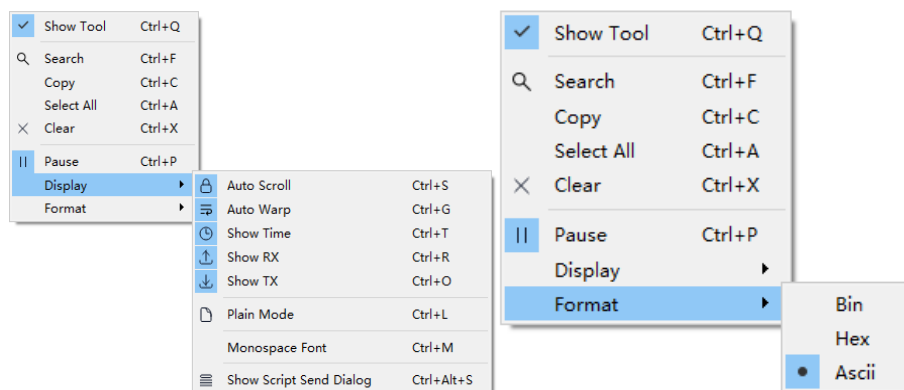










Figure 35: Details on Com Tool Menu

The “**Com Tool**” context menu information is as follows:

- **Show Tool**: Set whether the left sidebar is visible. Shortcut: **Ctrl+Q**.
- **Search**: Regular match filtering and highlighting. Shortcut: **Ctrl+F**.
- **Copy**: Copy selected context. Shortcut: **Ctrl+C**.
- **Select All**: Select all current context in “**Com Tool**”. Shortcut: **Ctrl+A**.
- **Clear**: Clear current context. Shortcut: **Ctrl+X**.
- **Pause**: Control whether to pause data appending. Shortcut: **Ctrl+P**.
- **Display**: Control data display.
 - **Auto Scroll**: Control whether to enable automatic data scrolling. Shortcut: **Ctrl+S**.
 - **Auto Warp**: Control whether the data automatically wraps when it exceeds the window width. Shortcut: **Ctrl+G**.
 - **Show Time**: Control whether to display the timestamp. Shortcut: **Ctrl+T**.
 - **Show RX**: Control whether to display the received data. Shortcut: **Ctrl+R**.
 - **Show TX**: Control whether to display the sent data. Shortcut: **Ctrl+O**.
 - **Plain Mode**: Control whether to output raw data without adding any extra characters. Shortcut: **Ctrl+L**.
 - **Monospace Font**: Set the output font to the same width font. Shortcut: **Ctrl+M**.
 - **Show Script Send Dialog**: Control whether to display the script sending window. Shortcut: **Ctrl+Shift+S**.
- **Format**: Text encoding.
 - **Bin**: Binary encoding.
 - **Hex**: Hex encoding.
 - **Ascii**: ASCII encoding.

Table 3: Description of Console Functions

Icon	Function	Description
	Search	Regular match filtering and highlighting
	Clear	Clear current context
	Pause	Control whether to pause data appending
	Auto Scroll	Control whether to enable automatic data scrolling
	Auto Warp	Control whether the data automatically wraps when it exceeds the window width
	Show Time	Control whether to display the timestamp
	Show RX	Control whether to display the received data
	Show TX	Control whether to display the transmitted data

Icon	Function	Description
	Plain Mode	Control whether to output raw data without adding any extra characters
	Show Script Send Dialog	Control whether to display the script sending window
	Send Data	Click to send input data
	Advance	Configure the data parameters to be sent
	Match Case	Control whether to enable case matching
	Enable Filter	Control whether to enable filtering
	Save File	Control whether to save filtered data to a file

Press the shortcut key “**Ctrl+F**” or click the button to display the search box in the upper right corner. Enter the relevant content and click the button under the search box to display the matched data in the new right box.

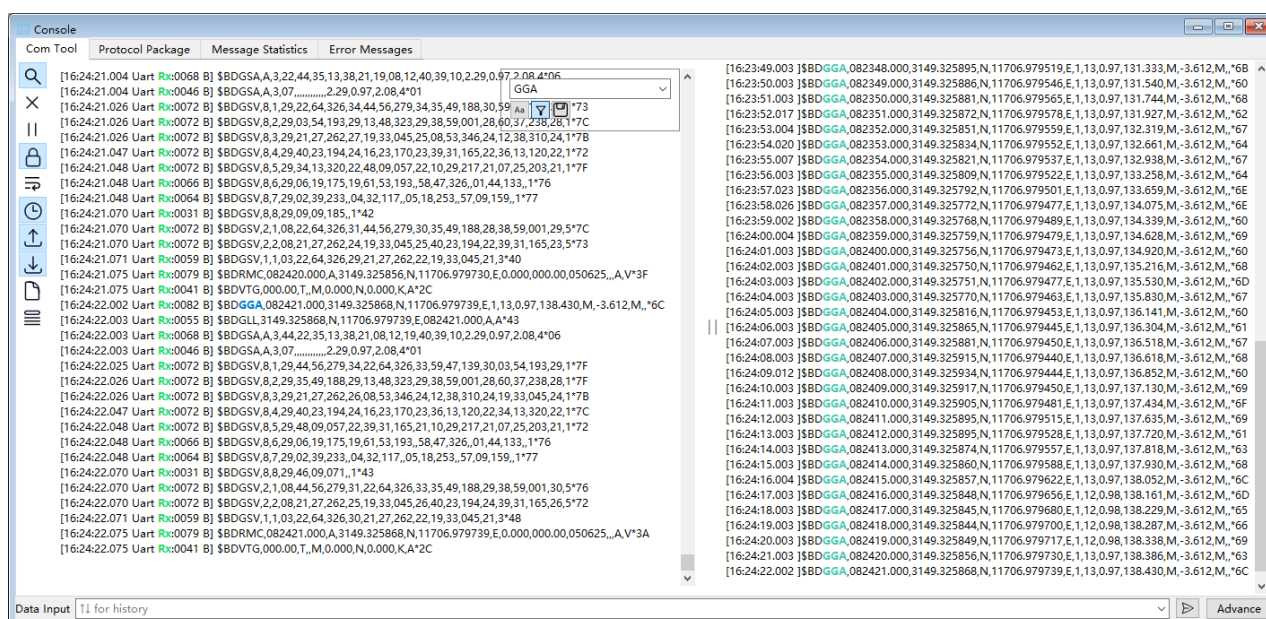


Figure 36: Com Tool Data Filtering

Click the button in the left column of “**Com Tool**”, the “**Script Send**” window pops up. You can send one command at a time or enabled commands cyclically through this window, see [Chapter 3.2.2 Script Send](#) for details. Besides, the window also supports importing and exporting scripts.

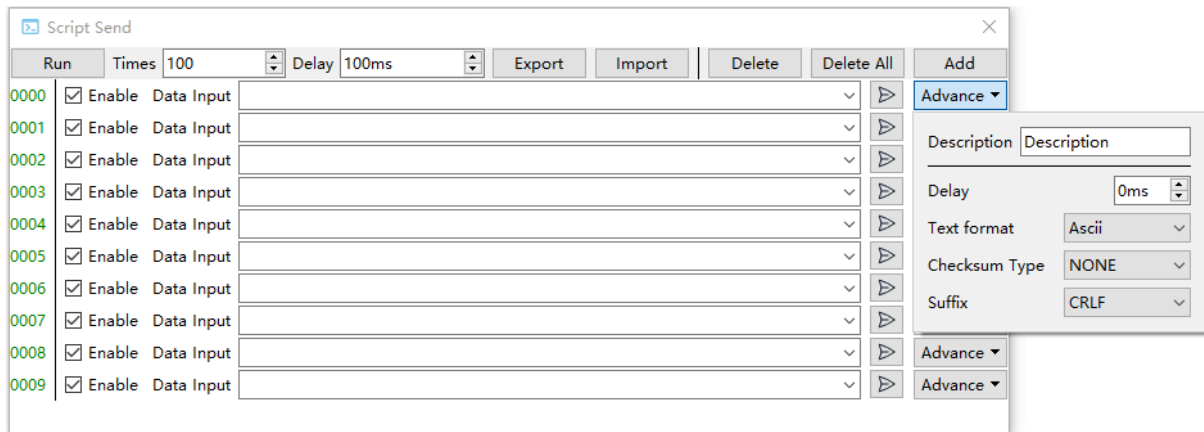


Figure 37: Script Console

Introduction on pop-up menu associated with the “**Advance**” button:

- **Description:** Input data description. Add this information to mark the purpose of the input data, which is useful when you open a previous script.
- **Delay:** Regulate the delay in milliseconds before the data is transmitted.
- **Text format:** Format of sent data, classified as:
 - **Bin:** Send binary data.
 - **Hex:** Send hexadecimal data.
 - **Ascii:** Send ASCII data.
- **Checksum Type:** Checksum types, classified as:
 - **NONE:** No checksum by default.
 - **NMEA:** Add NMEA checksum.
 - **RTCM3:** Add RTCM3 checksum.
- **Suffix:** Suffix information, classified as:
 - **None:** No suffix.
 - **CR:** Carriage return. Add suffix ‘r’.
 - **LF:** Line feed. Add suffix ‘n’.
 - **CRLF:** Carriage return line feed. Add suffix “\r\n”.
 - **LFCR:** Line feed carriage return. Add suffix “\n\r”.

2. Protocol Package Introduction

“**Protocol Package**” displays the parsed message. When the specific message on the left is selected, manually click on the right sidebar to support display of detailed message information.

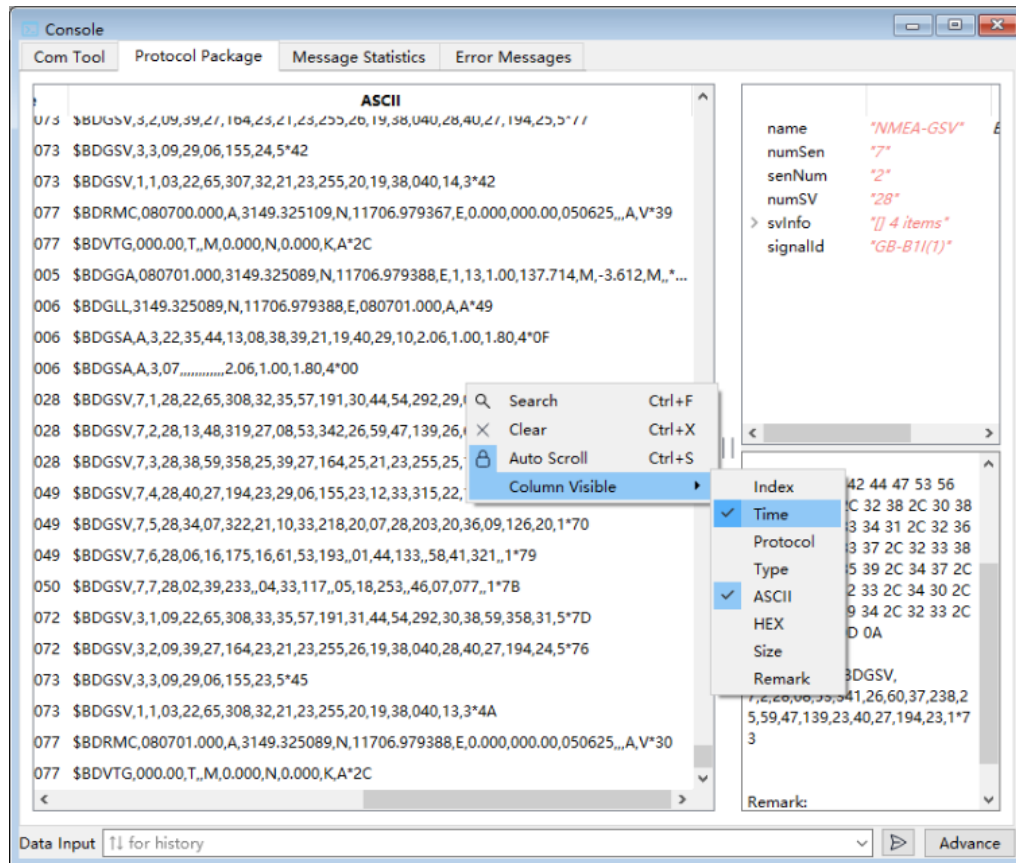


Figure 38: Protocol Package

Right-click the mouse and context menu pops up.

- **Search:** Regular match filtering. Shortcut: “**Ctrl+F**”.
- **Clear:** Clear current context. Shortcut: “**Ctrl+X**”.
- **Auto Scroll:** Control whether to enable automatic data scrolling. Shortcut: “**Ctrl+S**”.
- **Column Visible:** Control which columns are visible.
 - **Index:** Message index.
 - **Time:** Receiving time.
 - **Protocol:** Protocol type.
 - **Type:** Message type.
 - **Ascii:** ASCII encoding display.
 - **HEX:** Hexadecimal encoding display.
 - **Size:** Number of bytes.
 - **Remark:** Remark reserved for future use.

3. Message Statistics Introduction

“**Message Statistics**” perform statistics on parsed messages and record the received interval. Click the right column to display the details of the message.

Index	Time	Protocol	MsgType	Data	Number	Delay(ms)
0	06-05 16:26:3...	NMEA	GGA	\$BDGGA,0826...	1208	1000
1	06-05 16:26:3...	NMEA	GLL	\$BDGLL,3149...	1208	1000
2	06-05 16:26:3...	NMEA	GSA	\$BDGSA,A,3,3...	1703	999
3	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,1,2...	702	996
4	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,2,2...	702	997
5	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,3,2...	702	997
6	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,4,2...	702	997
7	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,5,2...	702	999
8	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,6,2...	702	999
9	06-05 16:20:5...	NMEA	GSV	\$BDGSV,7,7,2...	702	999
10	06-05 16:20:5...	NMEA	GSV	\$BDGSV,3,1,0...	708	1000
11	06-05 16:20:5...	NMEA	GSV	\$BDGSV,3,2,0...	708	1000
12	06-05 16:20:5...	NMEA	GSV	\$BDGSV,3,3,0...	708	999
13	06-05 16:26:3...	NMEA	GSV	\$BDGSV,1,1,0...	1208	1001
14	06-05 16:26:3...	NMEA	RMC	\$BDRCM,0826...	1208	1002
15	06-05 16:26:3...	NMEA	VTG	\$BDVTG,000.0...	1208	1001
16	06-05 16:06:2...	PQTM	VERNO	\$PQTMVERN...	1	0
17	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,1,2...	506	1000
18	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,2,2...	506	999
19	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,3,2...	506	999
20	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,4,2...	506	1000
21	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,5,2...	506	1000
22	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,6,2...	506	1001
23	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,7,2...	506	1000
24	06-05 16:26:3...	NMEA	GSV	\$BDGSV,8,8,2...	506	1000
25	06-05 16:26:3...	NMEA	GSV	\$BDGSV,2,1,0...	500	1001
26	06-05 16:26:3...	NMEA	GSV	\$BDGSV,2,2,0...	500	1001

name: "NMEA-GSV" BD

numSen: "3"

senNum: "2"

numSV: "9"

svinfo: "[] 4 items"

signalId: "GB-B2-a(5)"

Time: 2025-06-05 16:20:53.071

Protocol: NMEA

Size: 72

HEX Data:
2442444753562C332C322C30392C34302C32342
C3139342C32312C33382C35392C3030302C3237
2C32312C32362C3236312C32332C34342C35362
C3238312C32382C352A37370D0A

ASCII Data: \$BDGSV,
3,2,09,40,24,194,21,38,59,000,27,21,26,261,23,44,
56,281,28,5*77

Figure 39: Message Statistics

4. Error Messages Introduction

“Error Messages” perform statistics on error messages that occur during the parsing process, and record the types of errors.

Data	Remark
\$GNRMC,091800.00,A,3149.331696,N,11706.951069,E,0.0,,120422,,A,V*2	ECHECKSUM
\$GPGGA,091800.00,3149.331696,N,11706.951069,E,1,14,0.9,74.6,M,-3.6,M,,*1	ECHECKSUM
\$GNVTG,,T,,M,0.0,N,0.0,K,A*31	ECHECKSUM
\$GPGGA,091802.00,3149.331667,N,11706.951005,E,1,14,0.9,75.6,M,-3.6,M,,*5	ECHECKSUM
\$GPGSV,3,1,08,03,26,043,3,06,58,305,45,09,17,123,32,14,36,175,70,///1*5	ECHECKSUM
\$GPGSV,3,2,08,17,65,053,45,19,64,001,45,///1*6	ECHECKSUM
\$GPGSV,3,3,08,03,26,043,17,06,58,305,23,8*/	ECHECKSUM

Figure 40: Error Messages

5. Data Input Introduction

“Data Input” is multi-function data sending field. You can send one command at a time. Additional functions include historical data saving and deleting, as shown in figure below:

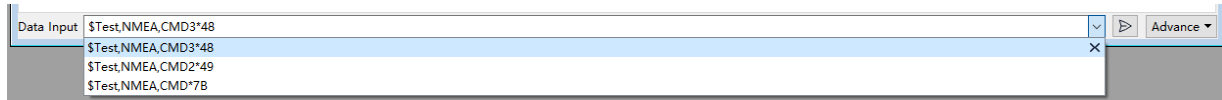


Figure 41: Data Input

2.2.5.7. GNSS Log Sub-Window

The “GNSS Log” displays a line chart of satellite signal-to-noise ratio, number of visible satellites, and number of satellites in use, and presents satellite data in the NMEA message.

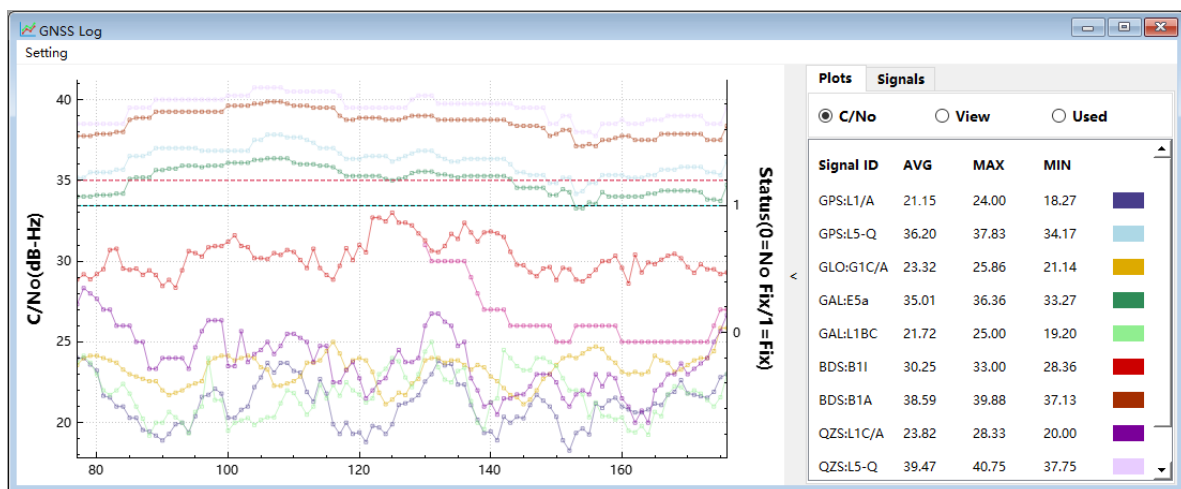


Figure 42: GNSS Log Sub-Window

There are “Plots” and “Signals” options on the right side of “GNSS Log”:

- “Plots” displays the current time, options of the three curve charts, i.e., satellite signal-to-noise ratio, number of visible satellites, and number of satellites in use, and the extremum and average values of the signal bands.
- “Signals” displays or hides the curves.

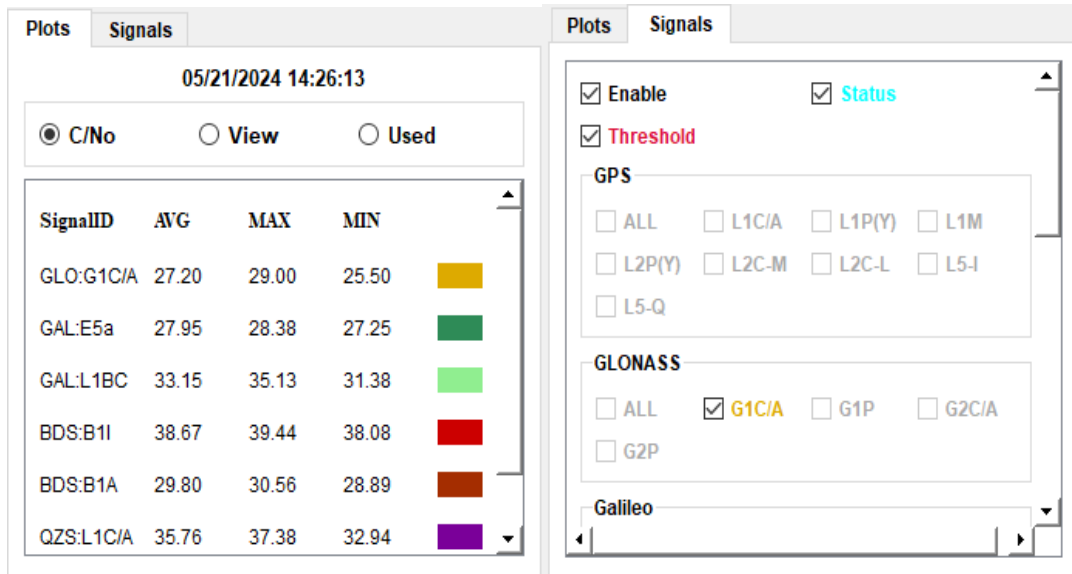


Figure 43: GNSS Log Right Tab

Right-click to open the curve menu.

- **Clear:** Clear all current data related to curve charts. Shortcut: **Ctrl+Del**
- **Refresh:** Restore curve charts to their initial state. Shortcut: **F5**
- **Comparison:** Check to open the point comparison view to show data points on the Y-axis that correspond to the points on the X-axis.

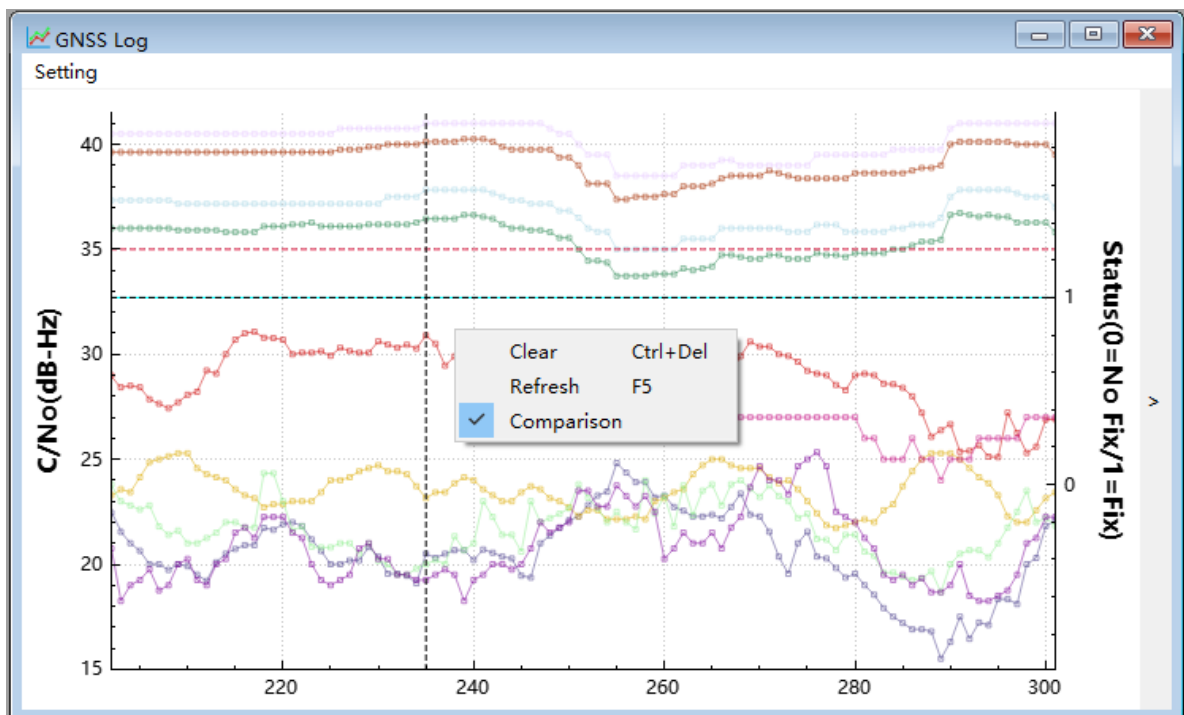


Figure 44: Curve Menu

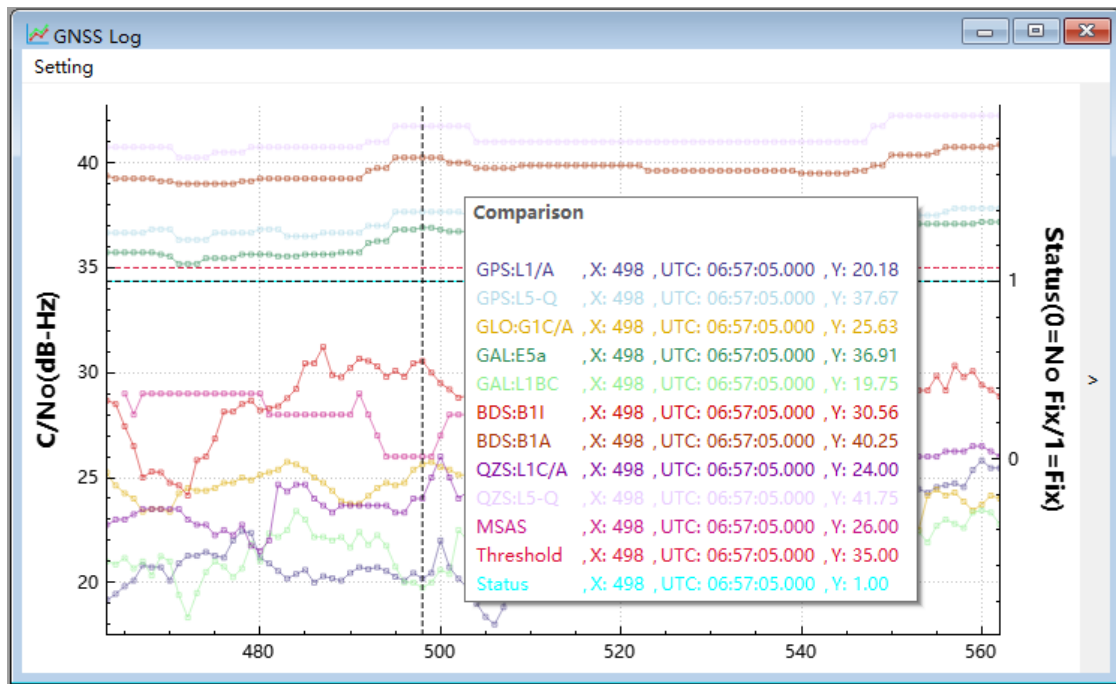


Figure 45: GNSS Log Comparison

2.2.6. Windows Tab

In the “**Windows**” tab menu:

- Click “**Cascade**” to display the sub-window(s) in a cascade pattern.
- Click “**Close All**” to close all sub-windows.
- Click “**Default Layout**” to select three pre-set interface layouts.

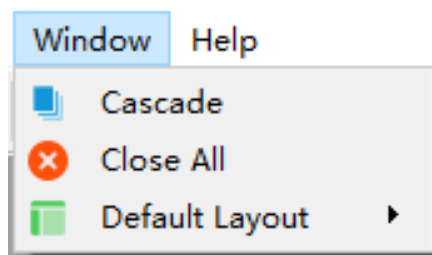


Figure 46: Window Tab

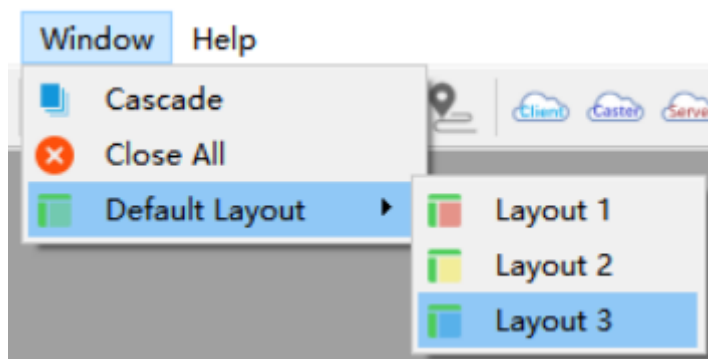


Figure 47: Default Layout Tab Menu

Display all the sub-windows in a cascade pattern.

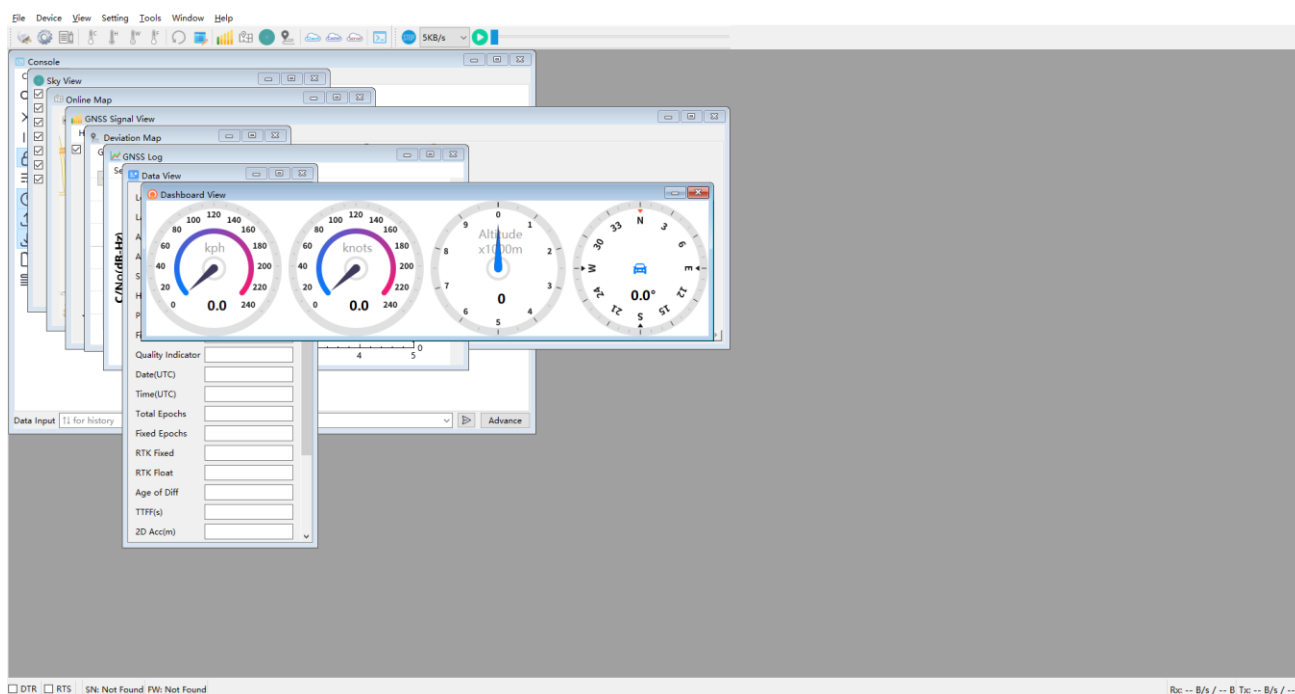


Figure 48: Cascade Window

Closes all windows.

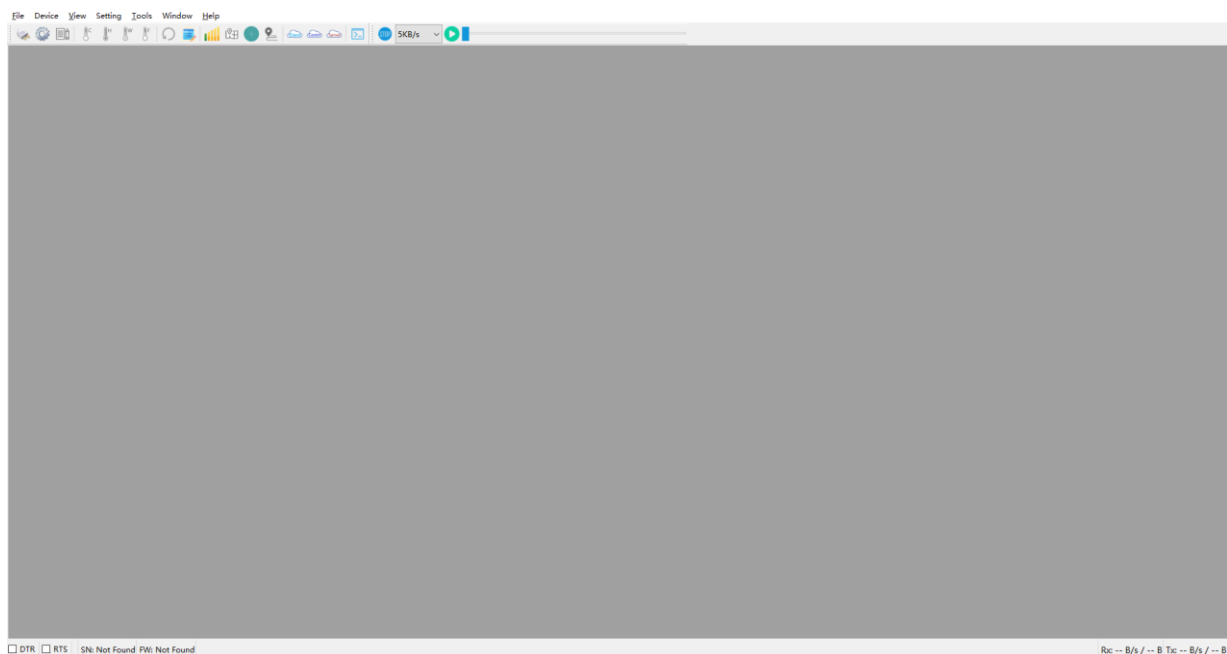


Figure 49: Close All Windows

The “**Default Layout**” has three basic interface layouts:

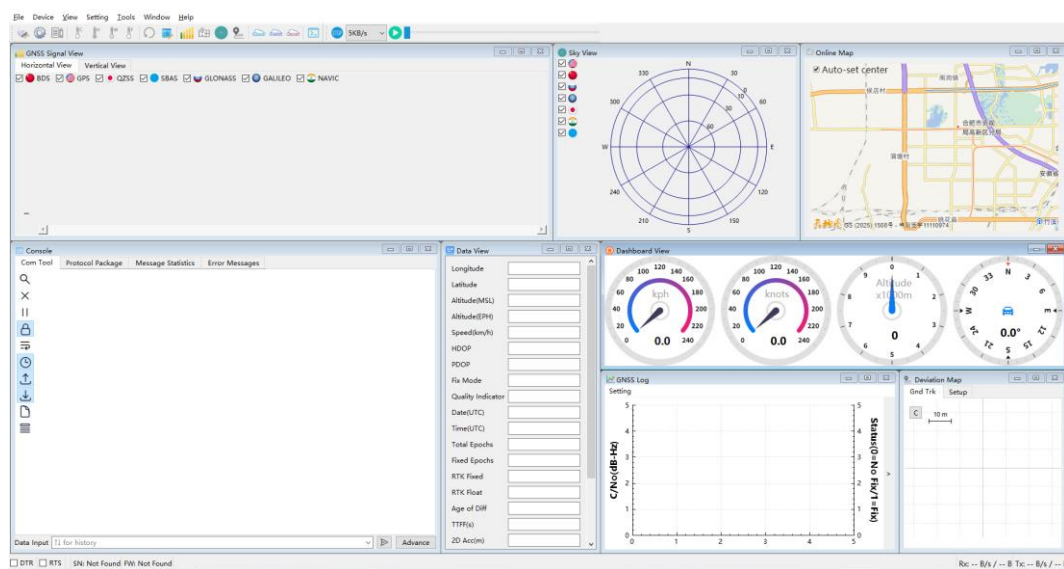


Figure 50: Default Layout – Layout 1

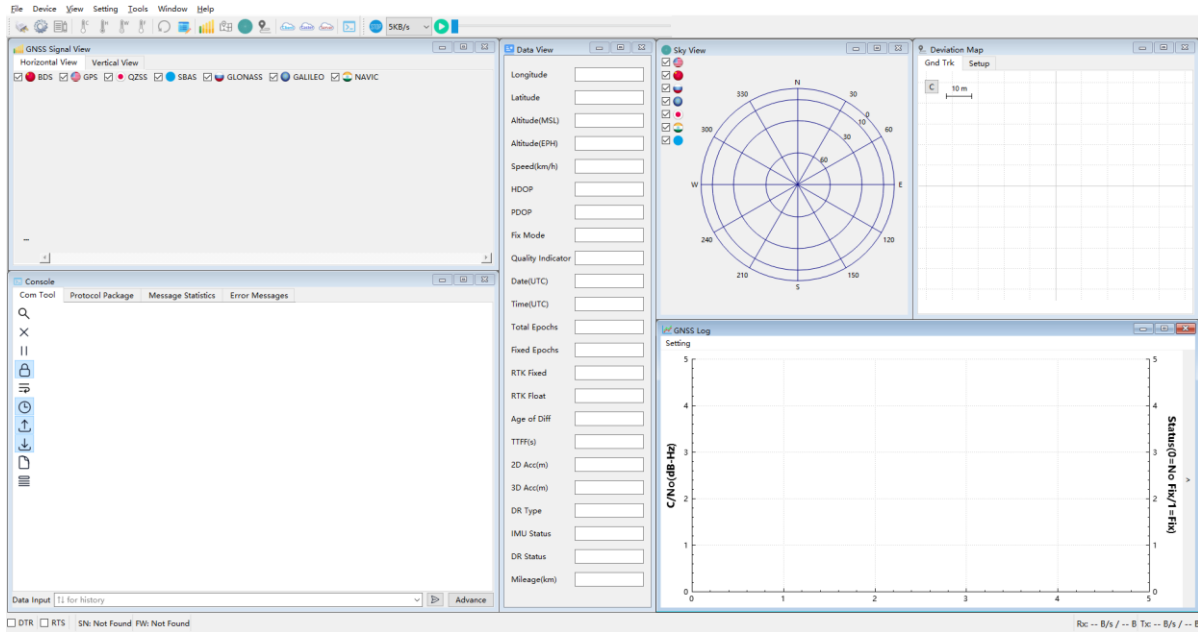


Figure 51: Default Layout – Layout 2

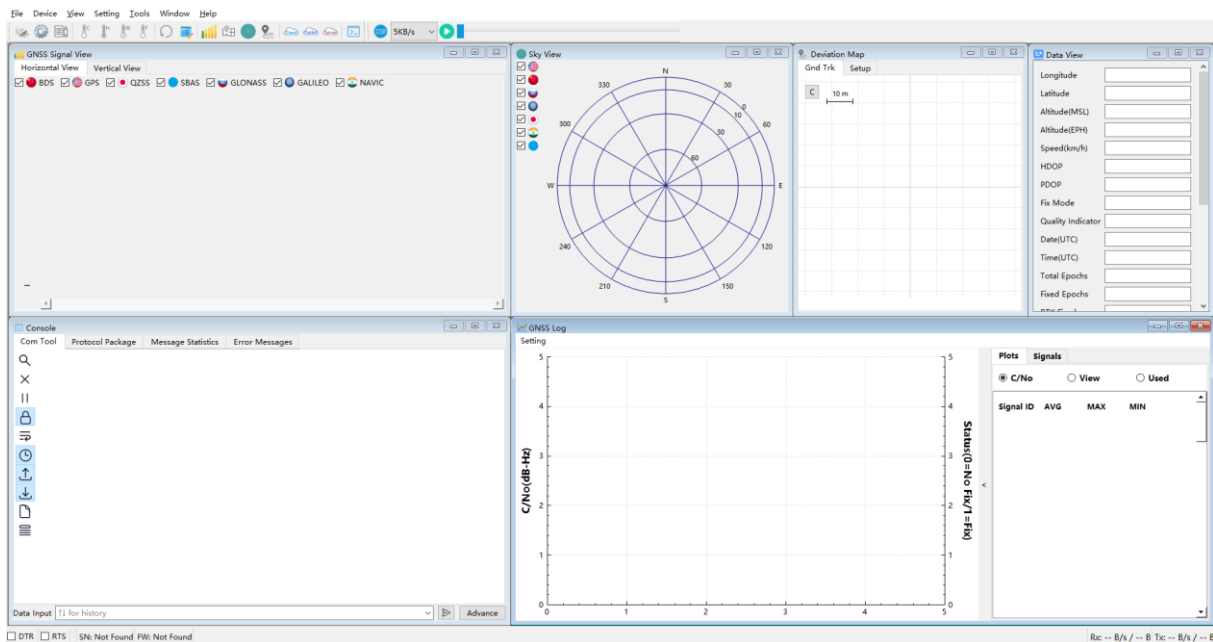


Figure 52: Default Layout – Layout 3

2.2.7. Help Tab

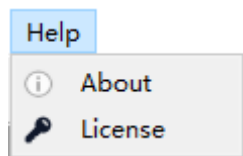


Figure 53: Help Tab

2.2.7.1. About Sub-window

Display QGNSS version and component version and compile time.



Figure 54: About Sub-Window

2.2.7.2. License Sub-Window

1. Generate registration code: Enter the username and email address and click the "**Generate Registration Code**" button to generate the registration code. The folder where the registration code is generated automatically opens.
2. Import license management and control function: Click "**Select License**" to obtain a license. Then reopen the software to load functions according to permissions.

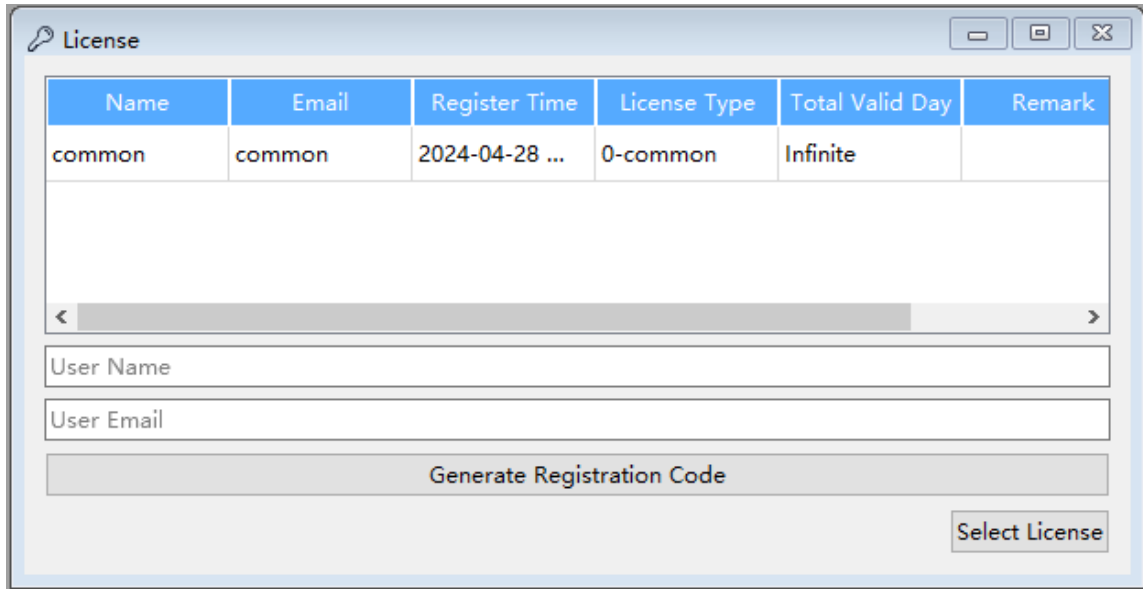


Figure 55: License Sub-Window






2.3. Tool Bar

















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



Figure 56: 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)
	Show Logfile in Explorer	Open the folder containing the saved log file(s)
	Cold Start	Send a cold start command
	Hot Start	Send a hot start command

Icon	Function	Description
	Warm Start	Send a warm start command
	Full Cold Start	Send a full cold start command
	Reboot	Send reboot command
	Log Recording Mode	Open the log recording mode
	GNSS Signal View	Open the “ GNSS Signal View ” 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
	NTRIP Client	Open the “ NTRIP Client ” sub-window
	NTRIP Caster	Open the “ NTRIP Caster ” sub-window
	NTRIP Server	Open the “ NTRIP Server ” sub-window
	Console	Open the “ Console ” sub-window
	Stop Play	Stop log play
	Play Speed	Select different rates for log play
	Start Play/Pause Play	Start/pause log play
	Play progress slider bar	Play progress bar, and click to drag the progress bar

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 57: Open Serial Port Configuration

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

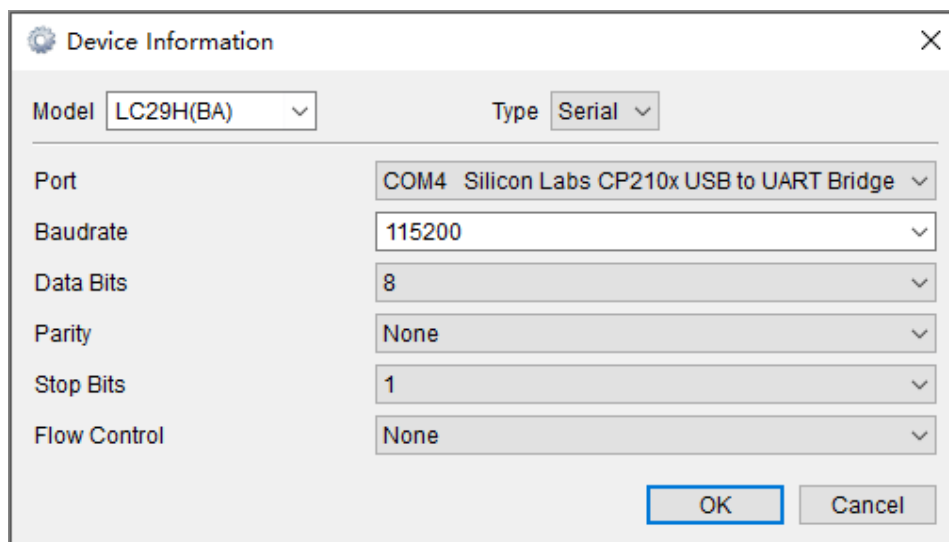


Figure 58: Serial Port Configuration Dialog


3.2. Console

3.2.1. Data Matching

Pressing the “**Ctrl+F**” shortcut key in “**Com Tool**” and “**Protocol Package**” will hide or show the search widget.



Figure 59: Search Widget

Data matching is executed by employing regular matching. For example, input “**\$GNRMC**” and then the matched strings “**\$GNRMC**” will be highlighted. Then click  button, the right side of “**Com Tool**” sub-window will display the matched newline data.

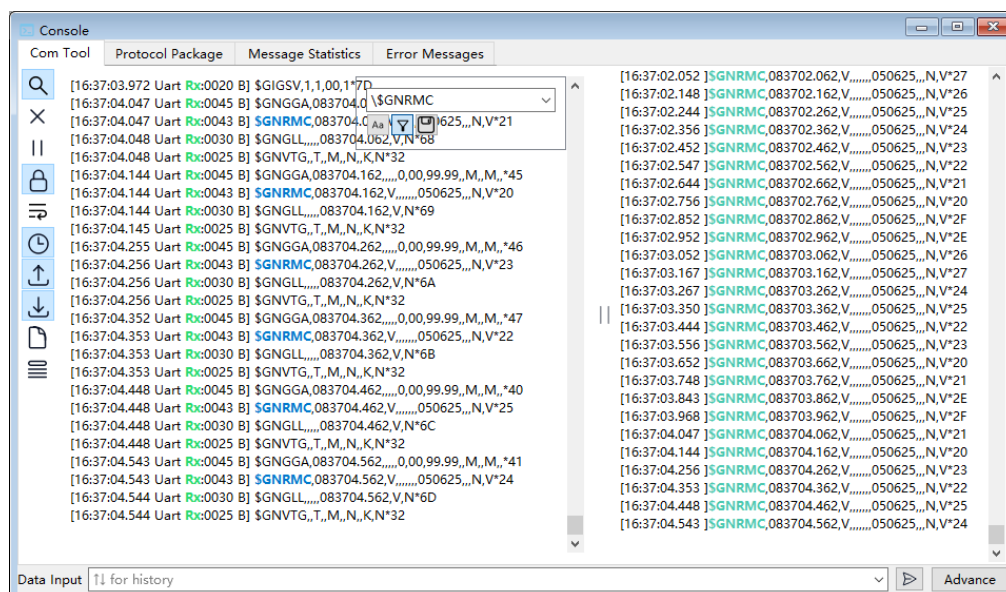


Figure 60: Com Tool Data Matching

Multiple messages can be matched simultaneously by adding “**|**”, for example, “**RMC|GGA**”.

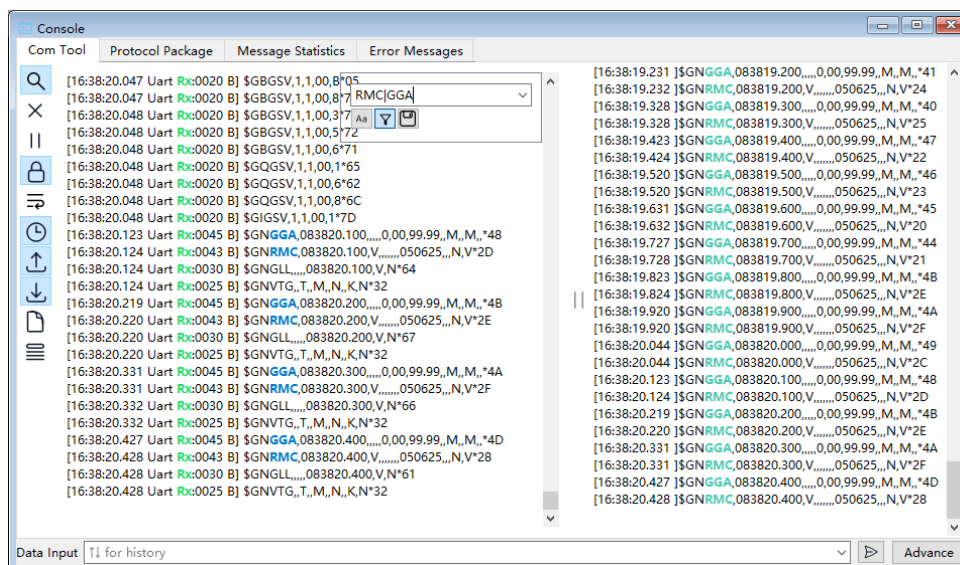


Figure 61: Multiple Messages Matching in Com Tool

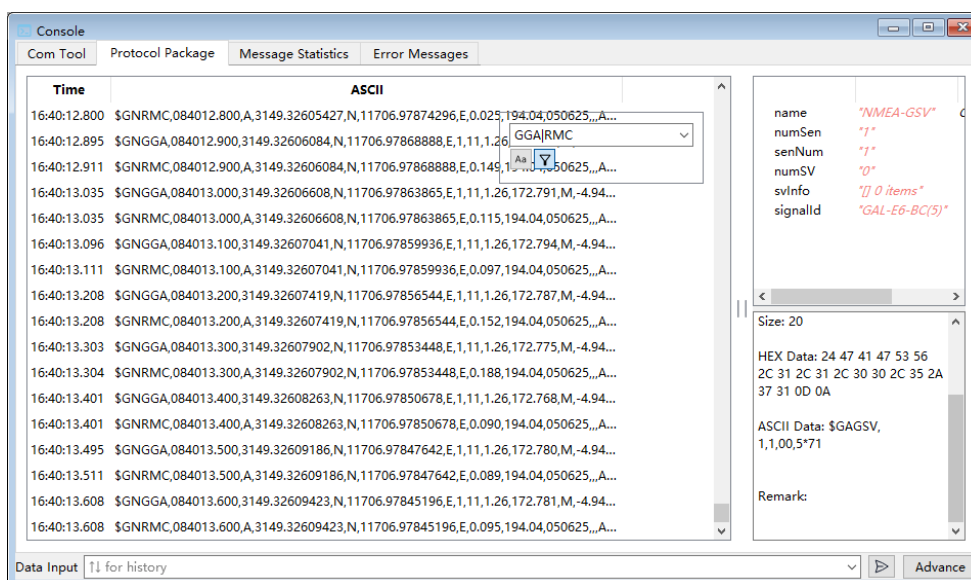


Figure 62: Multiple Messages Matching in Protocol Package

NOTE

1. Because characters like "\$" and "*" are escape characters in regular expressions, you need to add "\" in front of them to prevent escape. For example, "\$" in the regular expressions represents the end of the string. To match the "\$", use "\\$". Similarly, "*" is used to denote zero or more repetitions of the preceding subexpression. Thus, so to match the "*", employ "*".
2. The matching rule is to match by line.

3.2.2. Script Send

Click the  button on the left column of “Com Tool” to pop up the “Script Send” window.

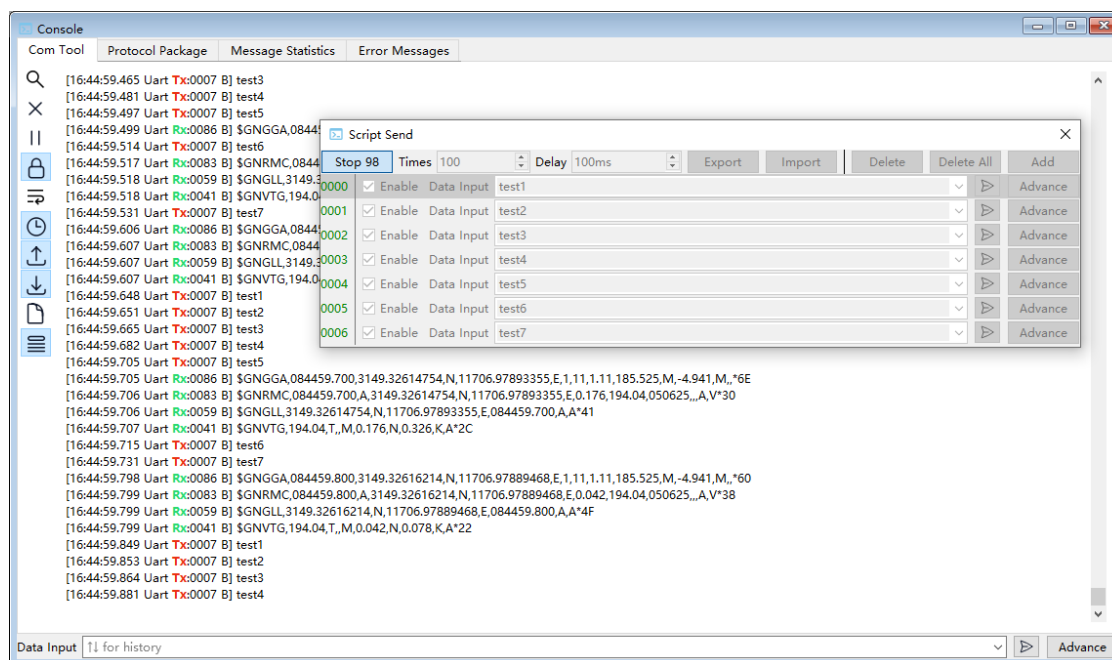





Figure 63: Send Script

Send one command at a time:

1. Enter the command to be sent in the command box.
2. Click the “**Advance**” button to configure the sending parameters in the pop-up menu, as shown in [Figure 37: Script Console](#).
3. Click  to send the command.

Send enabled commands cyclically:

1. Enter the commands to be sent in the command boxes one by one.
2. Click the “**Advance**” button to configure the sending parameters in the pop-up menu, as shown in [Figure 37: Script Console](#).
3. Enter the number of cycles in the box after “**Times**” and the delay time (unit: ms) of each cycle in the box after “**Delay**”.
4. Click  button, as shown in [Figure 37: Script Console](#), to send the commands cyclically. If you want to end the command sending in advance click .

3.2.3. Console Sub-Window Display

“Com Tool”, “Protocol Package” and “Message Statistics” in “Console” are displayed horizontally. You can switch the position of the windows by dragging the window tab to another tab with the mouse.

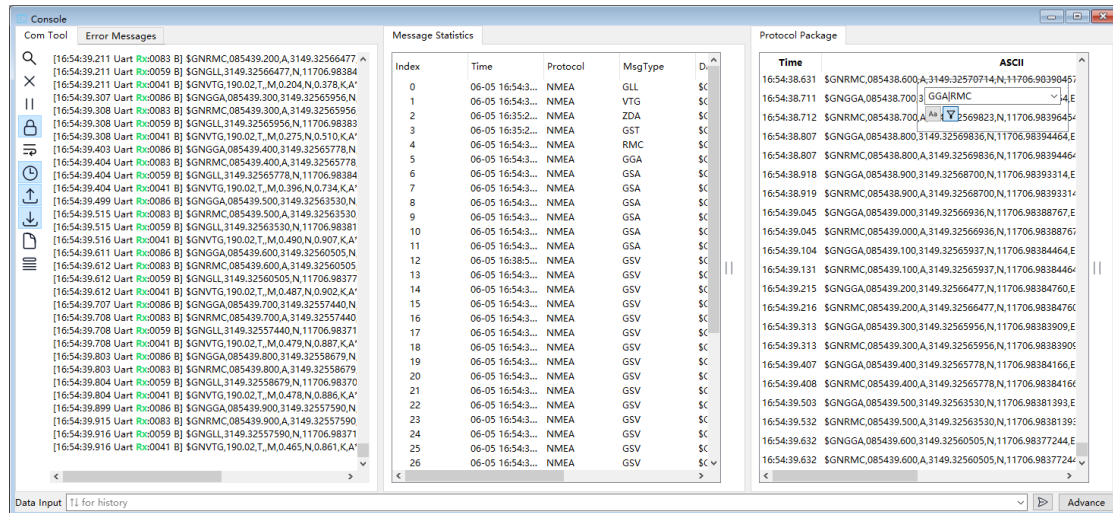


Figure 64: Console Window Display

Clicking on a non-tab area of the window, the “Move to Other View” tag pops up. Click on this tag can split the window into a new display.

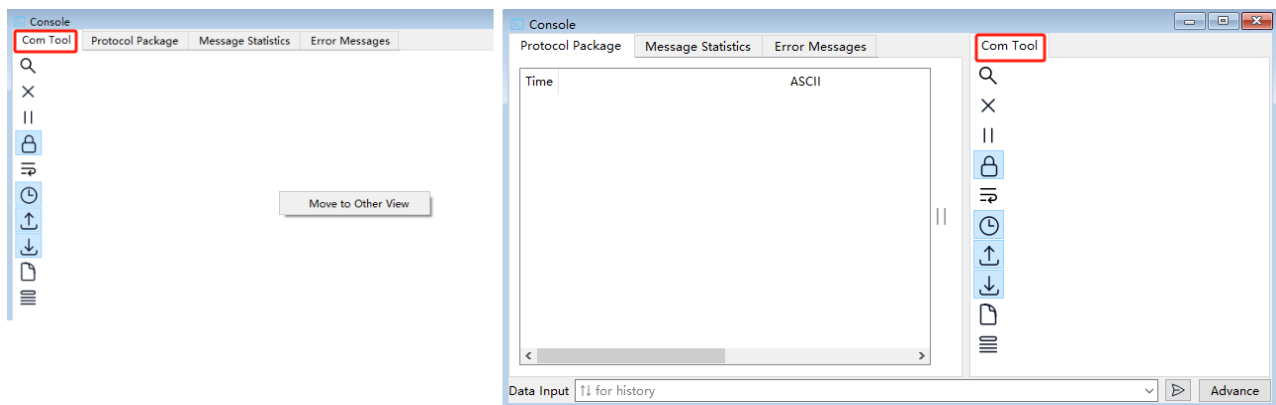


Figure 65: Console Window Splitting

3.3. Log Play

Steps to replay a recorded log file:

Step 1: Click the “Start Play” button to open the play dialog box.

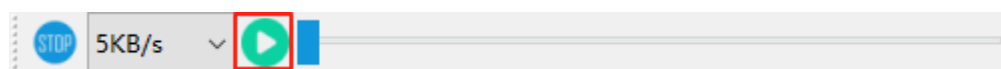


Figure 66: Log Play

Step 2: Select the module and enter log file path, select “**Default Mode**” and then click the “**OK**” button. This mode allows the use of all functions. Or select “**Specialized Analysis Mode**” and then click the “**OK**” button. This mode provides overall log parsing for GNSS Log to display the entire curve.

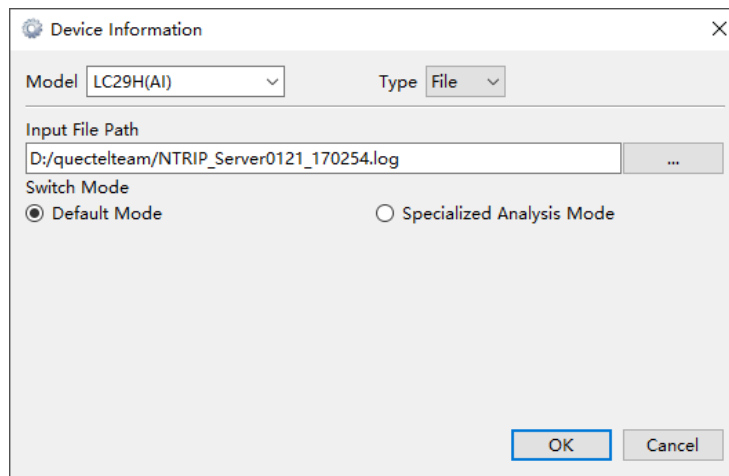


Figure 67: Select File – Default Mode

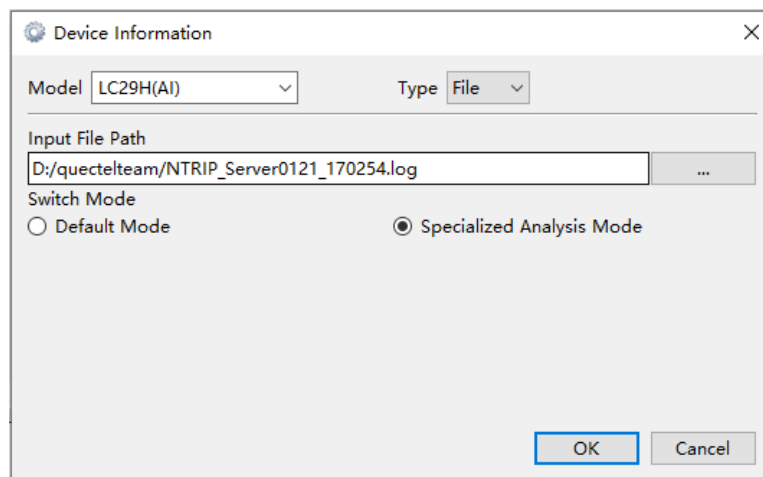


Figure 68: Select File – Specialized Analysis Mode

Step 3: Select the Read Rate (KB/s).

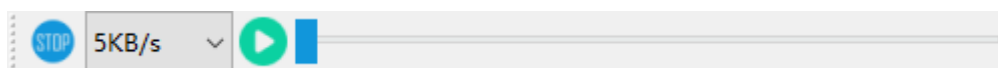


Figure 69: Play Controller

See [Table 4: Description of Tool Bar Functions](#) for the descriptions of above buttons.

3.4. 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](#).

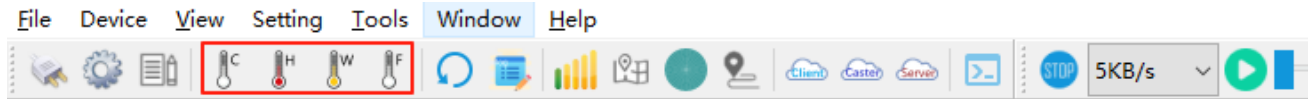


Figure 70: Restart Receiver

3.5. Configure Receiver

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

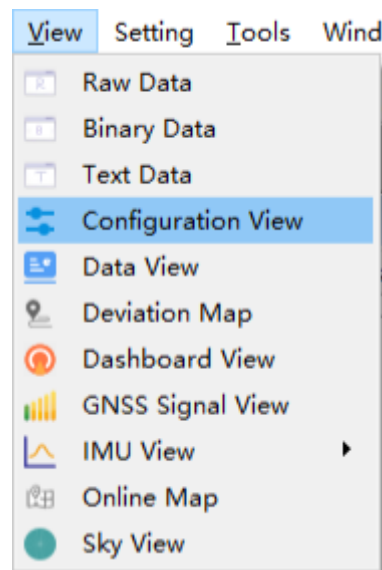


Figure 71: Open Configuration View

Step 1: Select the parameters to be configured and click “**Setting**” button.

Step 2: If the parameters support the query, click the “**Query**” button to query the configuration parameters.

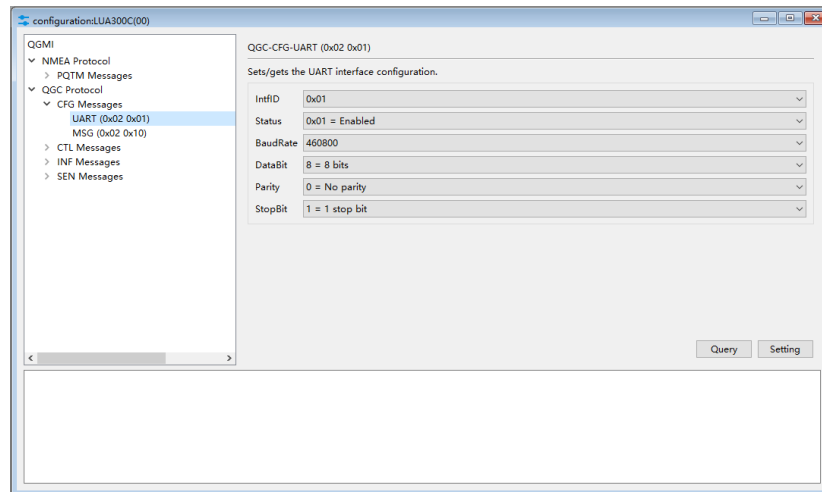


Figure 72: Configuration View

3.6. Download AGNSS Data from Server

The QGNSS tool incorporates an AGNSS feature that enables the downloading of AGNSS data files from FTP server using two distinct approaches: **“Online AGNSS”** and **“Offline AGNSS”** data downloading.

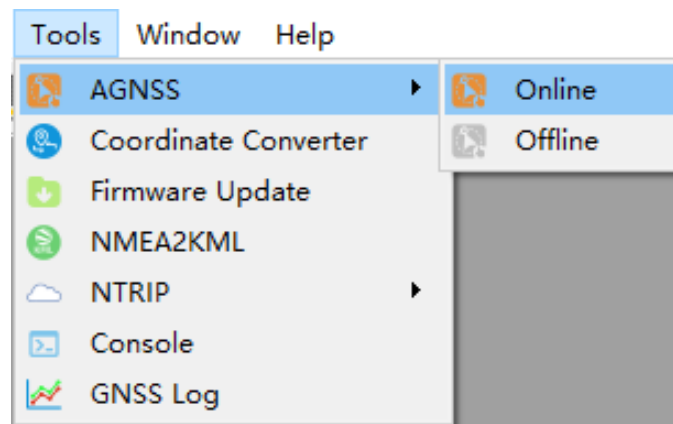


Figure 73: Open AGNSS Sub-Window

3.6.1. Online AGNSS

Click **“Online”** in the **“AGNSS”** drop-down menu of the **“Tools”** tab to open the **“Online AGNSS”** window. See [Figure 73: Open AGNSS Sub-Window](#) for details.

Step 1: Select the check box before **“UTC”** to set the UTC time.

1. Select the **“Use System Time”** check box to use the system time.

2. Enter the leap second time in the “**Leap Second**” field.
3. Enter the time accuracy in the “**Time Accuracy**” field.

Step 2: Select the “**Position**” check box to set the position via one of the methods below:

- Manually input Latitude, Longitude, Altitude and Accuracy
- Select the “**Use Current Position**” check box to use the current output position of the module

Figure 74:Online AGNSS Sub-Window

Step 3: Download the EPO file.

1. Select the EPO files of the satellite systems that need to be downloaded
2. Select the Cold/Warm/Hot start command as required
3. Click ► to start download the EPO file

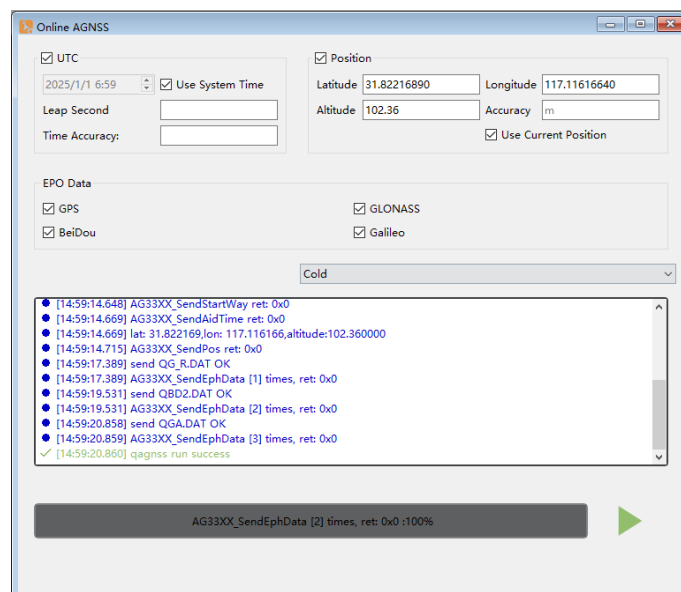


Figure 75: Download EPO File

3.6.2. Offline AGNSS

Click "**Offline**" in the "**AGNSS**" drop-down menu of the "**Tools**" tab to open the "**Offline AGNSS**" window. Then, select the EPO file of the satellite systems that need to be downloaded, and click ► to start download the EPO file.

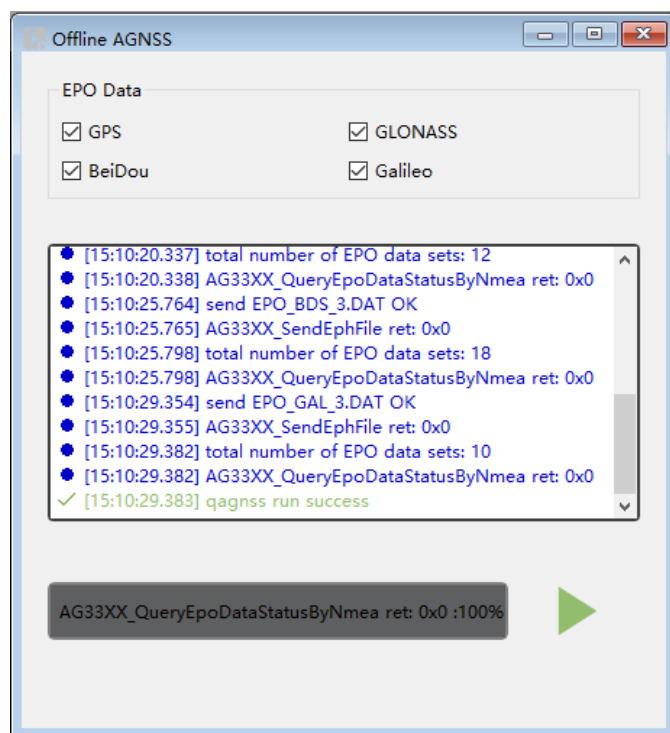


Figure 76: Offline AGNSS Sub-Window

3.7. Build NTRIP System

“Networked Transport of RTCM via Internet Protocol” (NTRIP) stands for an application level protocol streaming “Global Navigation Satellite System (GNSS)” data over the Internet. This section will overlook the NTRIP system supported by the QGNSS. Currently the QGNSS supports “**NTRIP Caster**”, “**NTRIP Server**” and “**NTRIP Client**” functions. For more detailed information on NTRIP, see [document \[1\] RTK application note](#).

3.7.1. NTRIP Caster

The QGNSS tool has implemented the “**NTRIP Caster**” function, which can deploy “**NTRIP Caster**” through the QGNSS tool to receive and send GNSS data streams. The detailed steps are as follows:

Step 1: Open the QGNSS tool, click the “**NTRIP**” option in the dropdown menu of “**Tools**”. Then click the “**Caster**” option, as shown in the figure below.

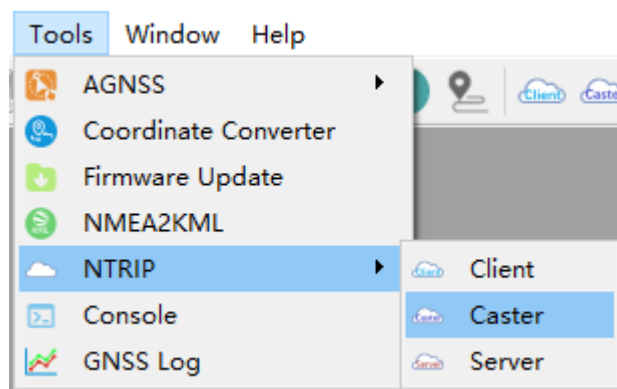


Figure 77: Open NTRIP Caster

Step 2: Enter the Address, Port, Username, and Password of “**Caster**”. If the Internet is required, make sure that the IP and ports can access to the Internet.

Step 3: Check the checkbox next to the “**Start/Stop**” and start the “**NTRIP Caster**”, as shown below.

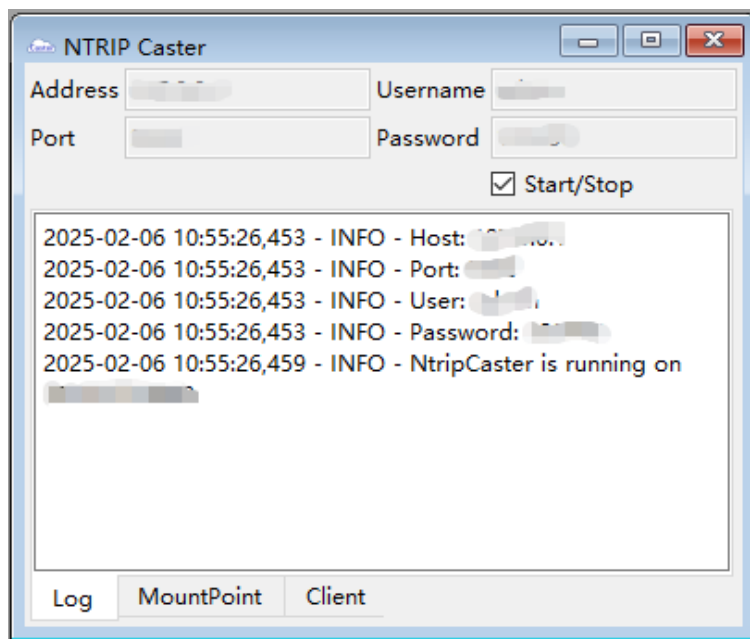


Figure 78: Start NTRIP Caster

NOTE

Quectel provides temporary “**NTRIP Caster**” to facilitate testing, the details are listed below:

Address: 172.29.104.32

Port: 7990

Username: QL_NTRIP

Password: 123456

3.7.2. NTRIP Server

Quectel not only has GNSS high-precision positioning modules, but also GNSS modules with original observation data, such as LC29H (BS) and LG69T (AS). This section introduces how to build “**NTRIP Server**” via the QGNSS using LC29H (BS) as the base station.

Step 1: Open the QGNSS tool and connect the LC29H (BS) module.

Step 2: Set the LC29H (BS) module as a Fixed mode or Survey-in mode.

1. If you know the true coordinate where the base station mounted, you can set the LC29H (BS) to Fixed mode and send the coordinate in ECEF format. For example:
 Host Send: \$PQTMCFGSVIN,W,2,0,0.0,-2472446.4619,4828304.1363,3343730.2653*34
 Module Response: \$PQTMCFGSVIN,OK*70

If you don't know the true coordinate, you can set the LC29H (BS) to Survey-in mode which determines the receiver's position by building a weighted mean of all valid 3D positioning solutions. For example:

Host Send: \$PQTMCFGSVIN,W,1,43200,15.0,0.0,0.0,0.0*13

Module Response: \$PQTMCFGSVIN,OK*70

2. Save the parameters:

Host Send: \$PQTMSAVEPAR*5A

Module Response: \$PQTMSAVEPAR,OK*72

Step 3: Click the “**NTRIP**” in the dropdown menu of “**Tools**”. A secondary menu pops up, select “**Server**” to open the “**NTRIP Server**” window, as shown below.

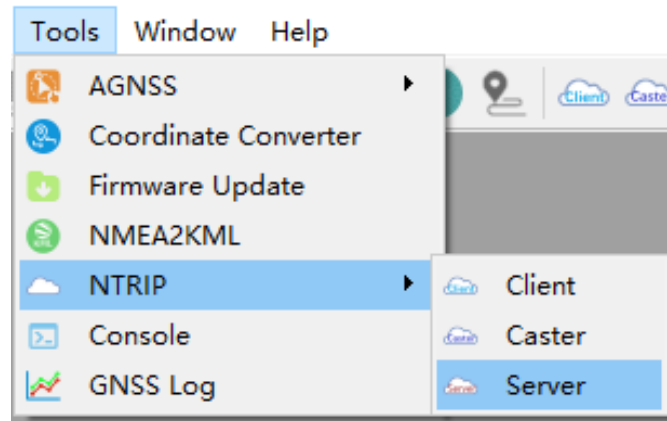


Figure 79: Open NTRIP Server

Step 4: Enter Caster Address, Port, Username, Password and Mountpoint. Ensure Caster Address, Port, Username and Password are corresponded to the “**NTRIP Caster**” to be connected. Mountpoint is the mount point to distinguish different NTRIP Source, and the input value is determined by the user. “**NTRIP Client**” obtains the correction data through the corresponding mountpoint.

Step 5: Check the checkbox next to the “**Start/Stop**” and start “**NTRIP Server**”, as shown in the figure below. After the “**NTRIP Server**” function is started, the original observation data of LC29H (BS) will be transmitted to “**NTRIP Caster**”.

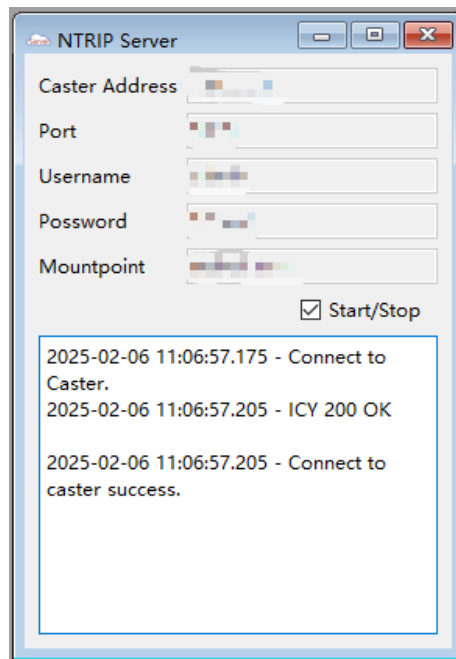


Figure 80: Start NTRIP Server

NOTE

In **Step 2**, you can set a lower number of positioning in Survey-in mode, such as 300, facilitating a rapid examination of the RTK outcomes. Nonetheless, for the acquisition of an accurate base coordinate, it is advised to extend the number of positioning to a minimum of 43200.

3.7.3. NTRIP Client

The NTRIP is a gateway for GNSS modules to receive RTK corrections, which can effectively improve the positioning accuracy. Click **Client** in the **Tools** tab drop-down menu to open **NTRIP Client** window.

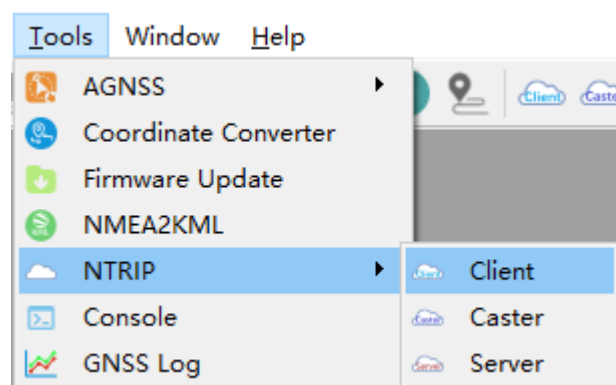


Figure 81: Open NTRIP Client

3.7.3.1. 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 as shown in [Figure 83: NTRIP Client](#). 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 below pops up for entering the relevant position data and then tick “**OK**” button. If the checkbox of “**Use manual position**” is unticked, the module will use the data of **<Quality>** parameter of the **GGA** message in Fixed mode.

Figure 82: Manually Enter Position

Step 6: Turn on the “**Connect to Host**” switch.

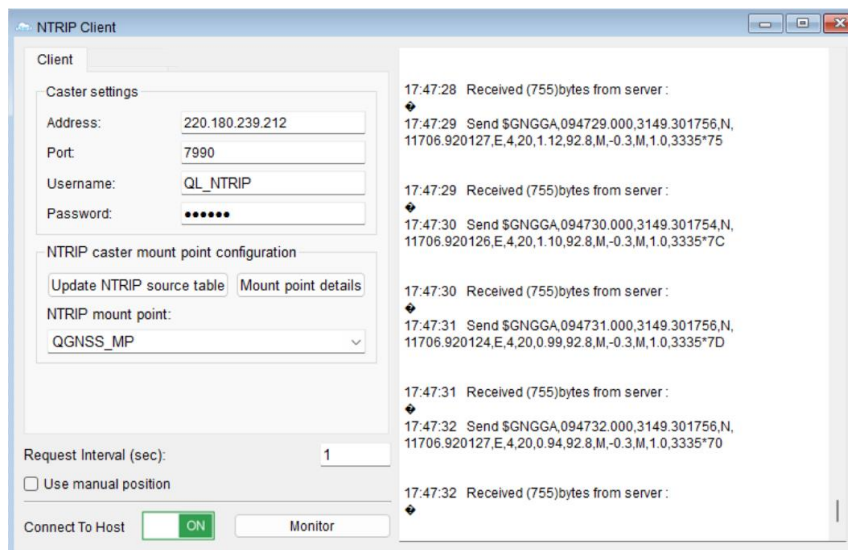


Figure 83: NTRIP Client

Step 7: Check whether the GNSS module receives the differential correction data. After receiving the differential correction data, check whether the value of parameter **<Quality>** in the **GGA** messages is 4 (4 corresponds to the fixed RTK mode), as shown in figure below:

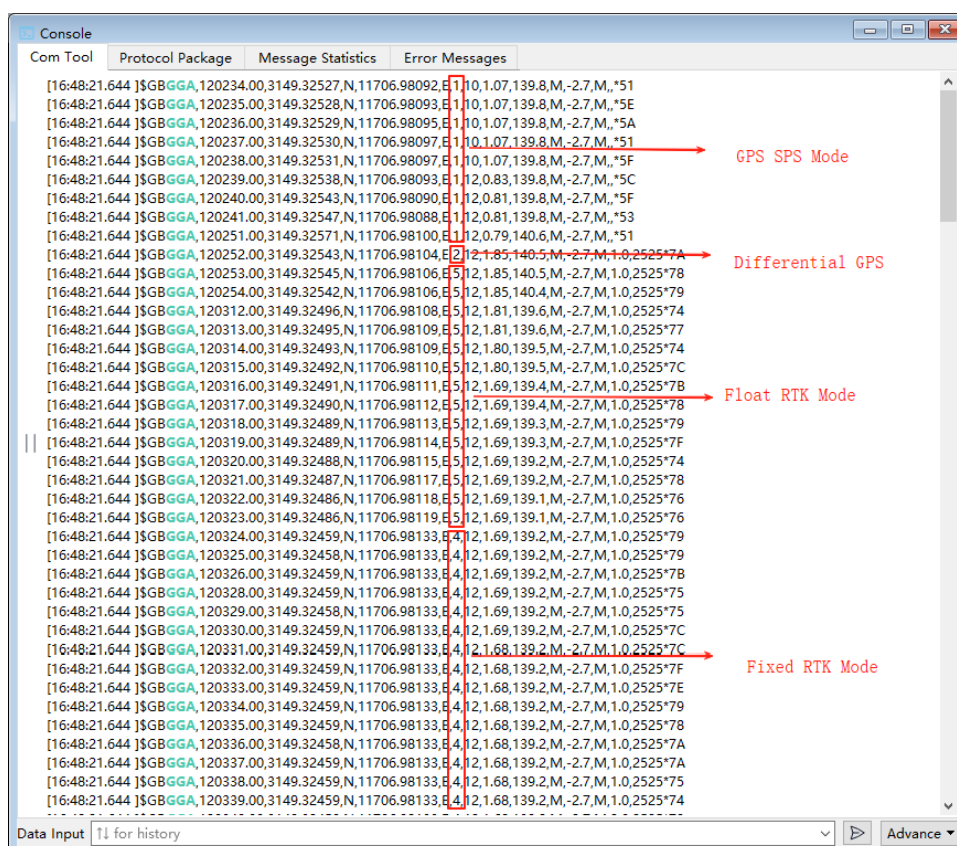


Figure 84: Module Entering Fixed RTK Mode

3.7.3.2. Data Monitor

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

NTRIP Client: Data Monitor

Basic Data

	Parameter	Value
1	Message Time	2025/01/13 09:35:05.000
2	Station Pos X/Y/Z (m)	-2471936.524,4828785.859,3343359.092
3	Station Lat/Lon/Height (deg,m)	31.81845445,117.10866863,31.007
4	GPS Signal	L1C/A,L2Z,L2C(M+L),L5(Q)
5	GLONASS Signal	G1C/A,G2P
6	Galileo Signal	E1(C),E5b(Q),E5a(Q)
7	QZSS Signal	L1C/A,L2C(M+L),L5(Q)
8	SBAS Signal	
9	BeiDou Signal	B1I,B3I,B2a(P),B1C(P)
10	NavIC Signal	
11	GPS RTCM3 MSM Signal(RINEX code)	L1C(2),L2W(10),L2X(17),L5Q(23)
12	GLONASS RTCM3 MSM Signal(RINEX code)	L1C(2),L2P(9)
13	Galileo RTCM3 MSM Signal(RINEX code)	L1C(2),L7Q(15),L5Q(23)
14	QZSS RTCM3 MSM Signal(RINEX code)	L1C(2),L2X(17),L5Q(23)
15	SBAS RTCM3 MSM Signal(RINEX code)	
16	BeiDou RTCM3 MSM Signal(RINEX code)	L2I(2),L6I(8),L5P(23),L1P(31)
17	NavIC RTCM3 MSM Signal(RINEX code)	
18	Station ID	2525
19	Station Health	0
20	Sequence No	0
21	ITRF Realization Year	0
22	Antenna Delta Type	E/N/U

Figure 85: RTK Data Monitor

3.8. Firmware Update

Connect to the receiver as explained in [Chapter 3.1 Connect to Receiver](#). Click “**Firmware Update**” in the “**Tools**” tab drop-down menu to open “**Firmware Update**” window.

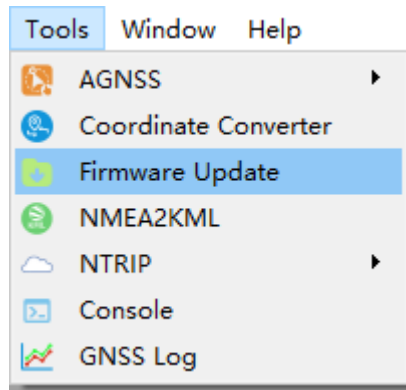


Figure 86: Open Firmware Update

Step 1: Click  to select the receiver firmware.

Step 2: Click Settings to select the baudrate.

Step 3: Click  to start the firmware upgrade process and wait for the process to complete.

Step 4: Reset module.

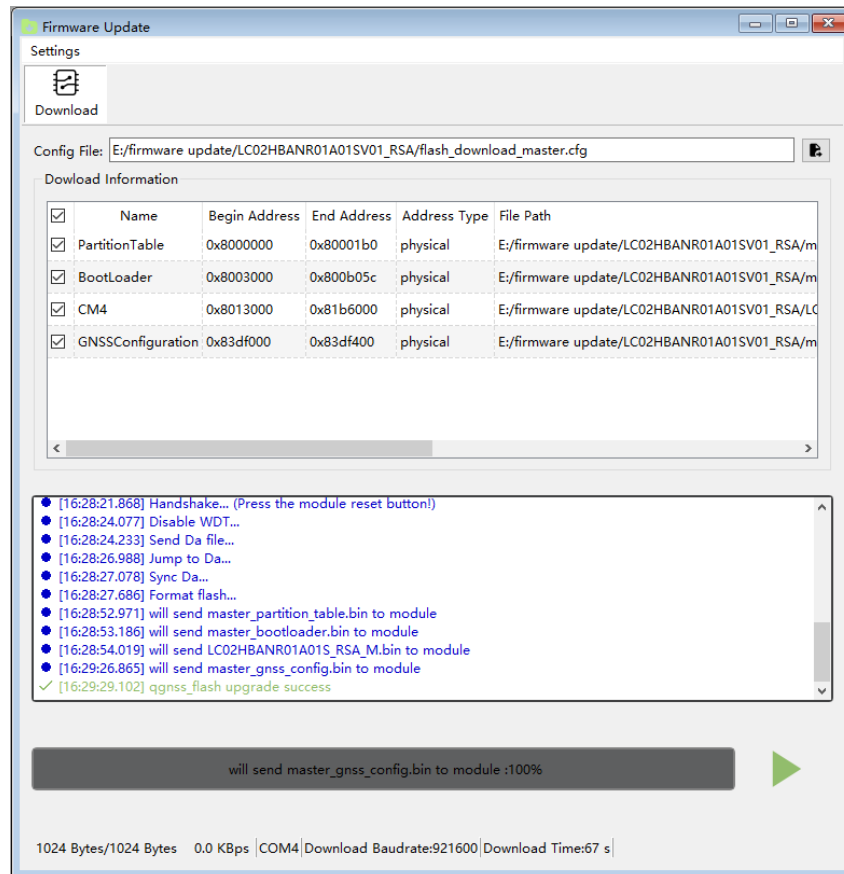


Figure 87: Firmware Update Process

NOTE

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

4 Appendix References

Table 5: Related Document

Document Name
[1] Quectel_GNSS_RTK_Application_Note

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
Galileo	Galileo Satellite Navigation System (EU)
GLONASS	Global Navigation Satellite System
GNSS	Global 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

Abbreviation	Description
QZSS	Quasi-Zenith Satellite System
RTK	Real-time Kinematic
SBAS	Satellite-Based Augmentation System
TTFF	Time to First Fix