

QGNSS User Guide

GNSS Products

Version: 3.4

Date: 2026-07-03

Status: Released



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About the Document

Document Information	
Title	QGNSS User Guide
Subtitle	GNSS Products
Document Type	User Guide
Document Status	Released

Revision History

Version	Date	Description
1.0	2020-01-03	Initial
2.0	2023-05-23	- Updated the tool version to V1.8. - Numerous changes were made to this document. It should be read in its entirety. - Adjusted the scope of application from LC79D to all GNSS modules.
2.1	2023-10-16	- Updated the tool version to V1.9. - 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 the figure of firmware download process (Figure 50).
2.2	2024-01-09	Updated the tool version to V1.10.
3.0	2024-08-29	- Updated the tool version to V2.0. - Numerous changes were made to this document. It should be read in its entirety.
3.1	2025-04-17	- Updated the tool version to V2.1. - Numerous changes were made to this document, including but not limited to optimizing interface icons, fixing internal defects. It should be read in its entirety.

Version	Date	Description
3.2	2025-07-01	- Updated the tool version to V2.2. - Added “Raw Data”, “Binary Data” and “Text Data” sub-windows (Chapters 2.2.3.1, 2.2.3.2 and 2.2.3.3). - Added “GNSS Coordinate Transformation” sub-Window (Chapter 2.2.5.3). - Added “Error Messages” (Chapter 2.2.5.7).
3.3	2026-01-22	- Updated the tool version to V2.3. - Added TTFF test function and “TTFF” sub-window (Chapters 1, 2.2.5.2 and 3.6.2). - Added the “Open” option under the “File” tab (Chapter 2.2.1). - Added the “Attitude Dashboard View” sub-window (Chapter 2.2.3.7). - Added a note that only IMU data from the QGC protocol is supported for display (Chapter 2.2.3.10). - Added downloading AGNSS files via HTTP/MQTT protocol (Chapter 2.2.5.1). - Added QGC (QGC/VNC) checksum (Chapter 2.2.5.7). - Updated the contents of “GNSS Log” sub-window (Chapter 2.2.5.8): - Updated the indication of the maximum and minimum values of the frame-averaged C/N₀ for the signal frequency band across multiple data frames from MAX and MIN to AMAX and AMIN in “Plot” option; - Added MAX and MIN data to indicate the maximum and minimum C/N₀ values achieved by an individual satellite in the signal frequency band within a single data frame in “Plot” option; - Added the steps for initiating log file statistical analysis. - Added a new default layout – Layout 4 (Chapter 2.2.6). - Added the “Check for Updates” sub-window (Chapter 2.2.7.2). - Added the “User Guide” sub-window (Chapter 2.2.7.3). - Updated the steps for downloading AGNSS data from server and added TTFF test after injecting AGNSS data (Chapter 3.6). - Updated the password of temporary “NTRIP Caster” account (Chapter 3.7.1).
3.4	2026-07-03	- Updated the tool version to V2.5. - Updated the “Open” option to “Open Log” under the “File” tab (Chapter 2.2.1). - Updated the contents of “Device Information” sub-window (Chapters 2.2.2, 3.1.1 and 3.1.2): - Added the auto baud rate detection feature; - Added the “TCP” option in the “Type” dropdown box to connect the TCP server. - Added new data items “Satellites in View”, “Satellites Used”, “Pitch”, “Roll”, “Heading” to the “Data View” sub-window (Chapter 2.2.3.5). - Updated the view of the “Attitude Dashboard View” sub-window and

Version	Date	Description
		added the GLB 3D View (Chapter 2.2.3.7).
		6. Added then ADR forward/backward indicator to the “Dashboard View” sub-window (Chapter 2.2.3.8).
		7. Added the average C/N ₀ values of different frequency bands for each satellite constellation to the “Vertical View” sub-window (Chapter 2.2.3.9).
		8. Added the “IMU Monitor” to “IMU View” sub-window (Chapter 2.2.3.10).
		9. Updated the original “NMEA2KML” to “NMEA2KMZ” (Chapters 2.2.5 and 2.2.5.5).
		10. Updated the contents of the “TTFF” sub-window (Chapters 2.2.5.2 and 3.6.2):
		● Added “Delay Range(Sec)” to set the range of delay time between the two TTFF tests; ● Updated the TTFF mode from “TTFF” and “AGNSS TTFF” to “TTFF Only”, “Online AGNSS TTFF” and “Offline AGNSS TTFF”.
		11. Added the “WGS-84 – DMS Format” to the “GNSS Coordinate Transformation” sub-window (Chapter 2.2.5.3).
		12. Updated the view of “Script Send” sub-window and added the "Choose all commands" function to configure parameters for all commands in one batch (Chapters 2.2.5.7 and 3.2.2).
		13. Updated the view of the “Error Message” sub-window (Chapter 2.2.5.7).
		14. Updated the contents of the “GNSS Log” sub-window (Chapter 2.2.5.8):
		● Added the DOP chart to the “Plots” option; ● Added the “Filter Options” function to the “Setting” option; ● Added “Tools” option with the “NMEA to HTML” function.
		15. Added voice alert function (Chapters 2.3 and 3.9).
		16. Updated the contents of “Build NTRIP System” (Chapters 3.7.1 to 3.7.3):
		● Added “Write Log” checkbox to enable the log recording feature; ● Added the “TLS” checkbox to enable Transport Layer Security encryption.

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1 Introduction

QGNSS is a tool that designed for all Quectel GNSS modules, allowing you to interact with those 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 TTFF (Time to First Fix) test.
- 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.

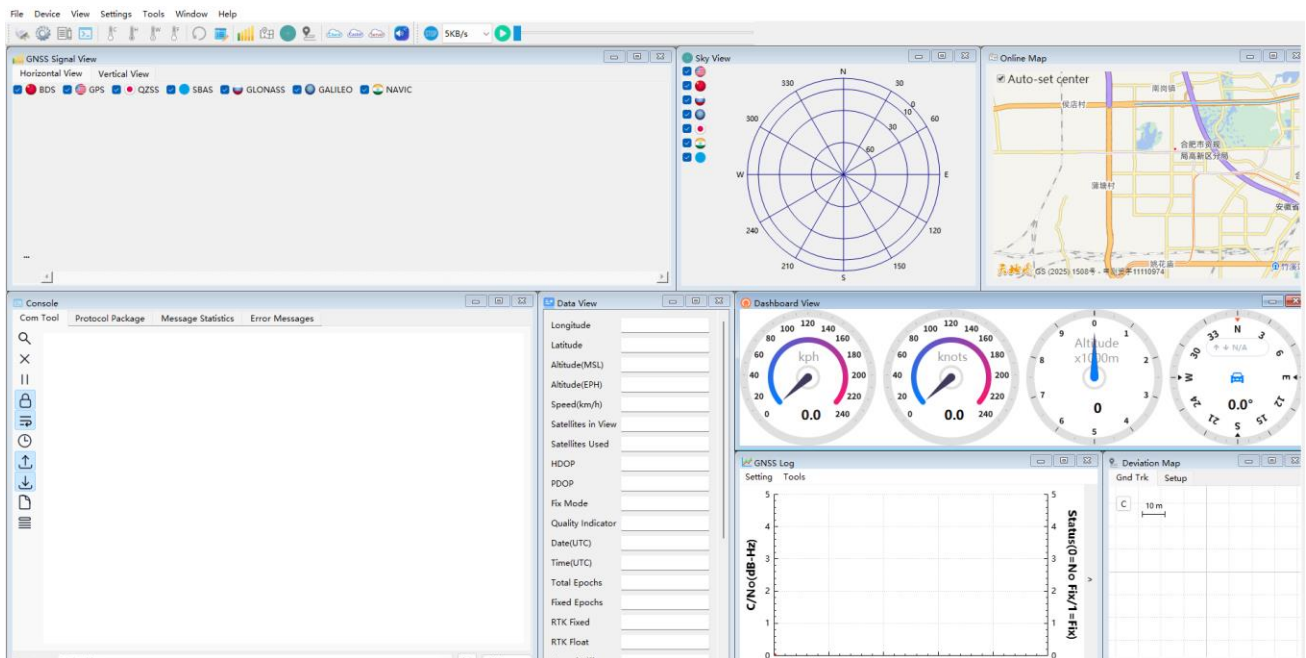


Figure 1: Main Window

2.2. Menu Bar

2.2.1. File Tab

In the “File” tab menu:

- Click “Open Log” to open logs saved by QGNSS.
- Click “Quit” to close QGNSS.

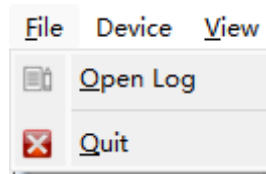


Figure 2: File Tab

2.2.2. Device Tab

In the “**Device**” tab menu:

- Click “**Connect**” to connect/disconnect the serial port.
- Click “**Device Info**” to configure serial port parameters or TCP server connection settings. See [Chapter 3.1 Receiver/TCP Server Connection](#) for details.

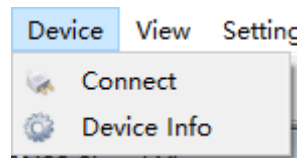


Figure 3: Device Tab

NOTE

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

2.2.3. View Tab

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

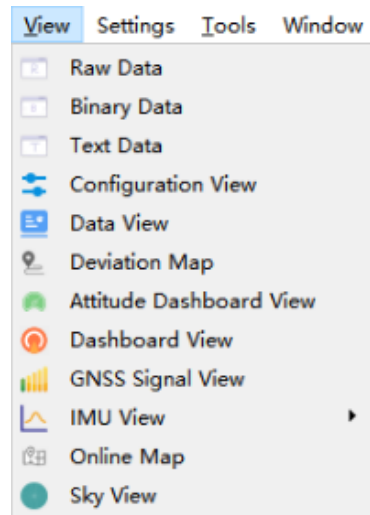


Figure 4: View Tab

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.

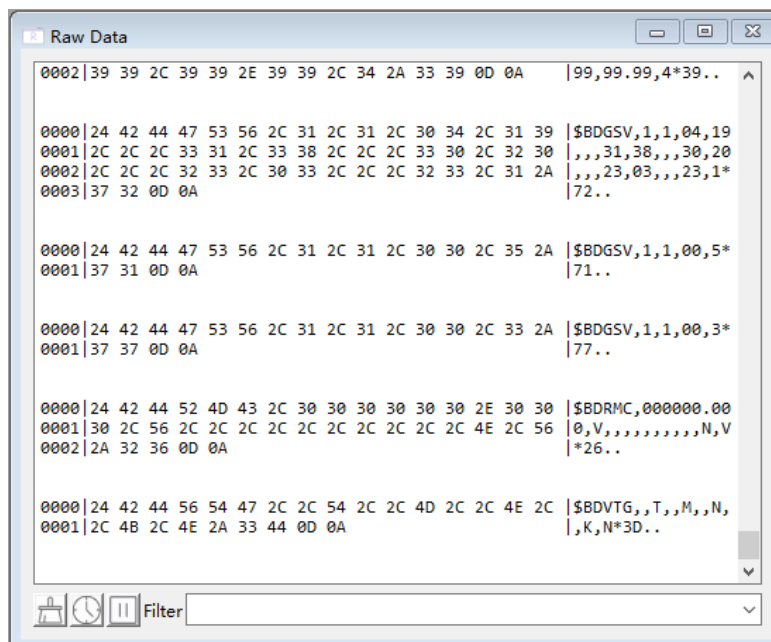


Figure 5: Raw Data Sub-Window

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.

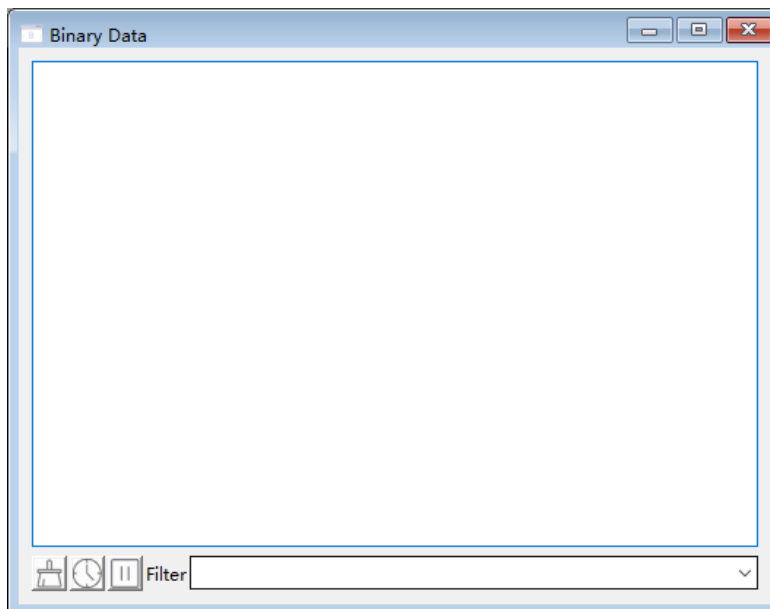


Figure 6: Binary Data Sub-Window

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.

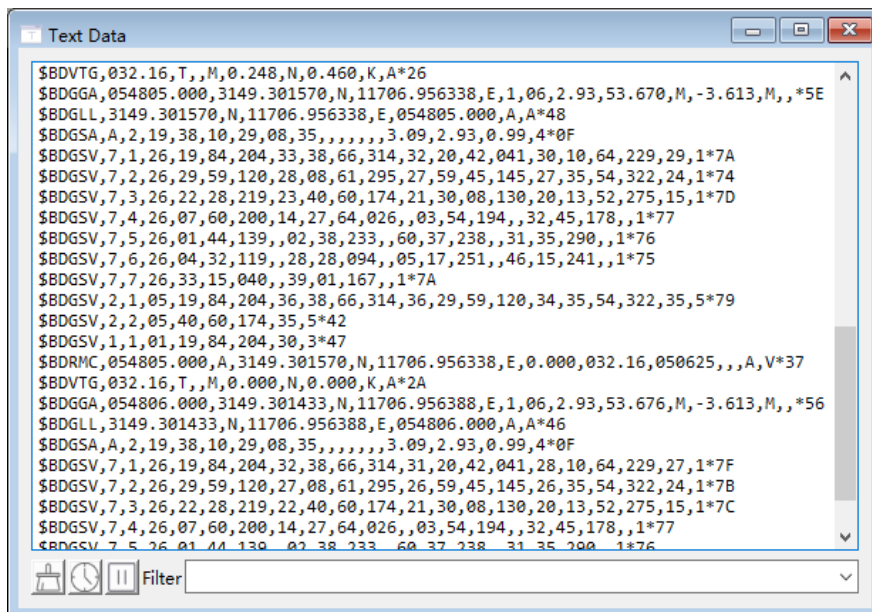


Figure 7: Text Data Sub-Window

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.

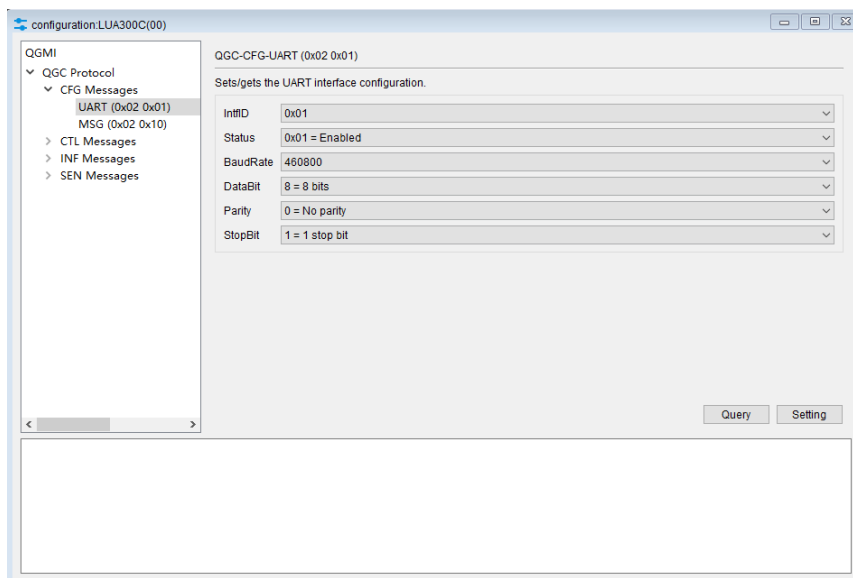
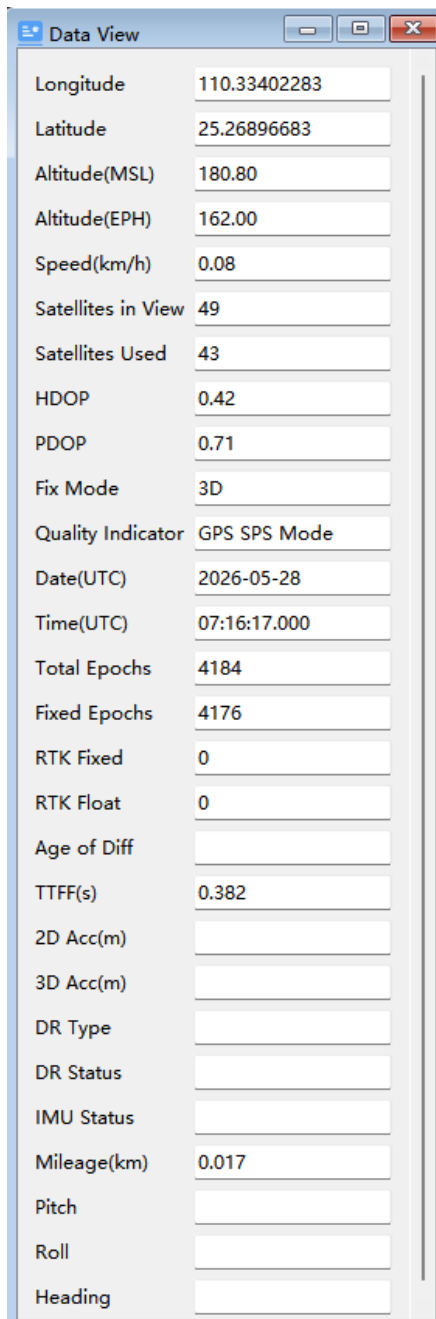


Figure 8: Configuration View Sub-Window

2.2.3.5. Data View Sub-Window

The “**Data View**” sub-window displays the data information, such as longitude, latitude, altitude, satellites in view, satellites used, fix mode, mileage, pitch, roll and heading.



Data View	
Longitude	110.33402283
Latitude	25.26896683
Altitude(MSL)	180.80
Altitude(EPH)	162.00
Speed(km/h)	0.08
Satellites in View	49
Satellites Used	43
HDOP	0.42
PDOP	0.71
Fix Mode	3D
Quality Indicator	GPS SPS Mode
Date(UTC)	2026-05-28
Time(UTC)	07:16:17.000
Total Epochs	4184
Fixed Epochs	4176
RTK Fixed	0
RTK Float	0
Age of Diff	
TTFF(s)	0.382
2D Acc(m)	
3D Acc(m)	
DR Type	
DR Status	
IMU Status	
Mileage(km)	0.017
Pitch	
Roll	
Heading	

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  , display the CEP circle, as shown in [Figure 11: Deviation Map Sub-Window – CEP](#).



Figure 10: Deviation Map Sub-Window – Gnd Trk

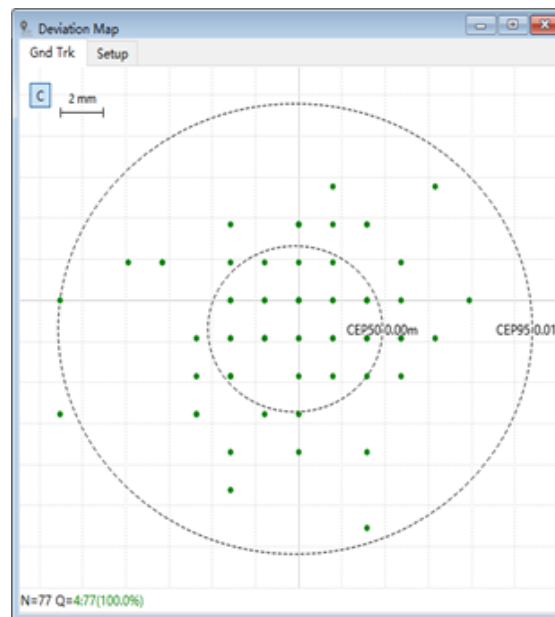


Figure 11: Deviation Map Sub-Window – CEP

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
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.

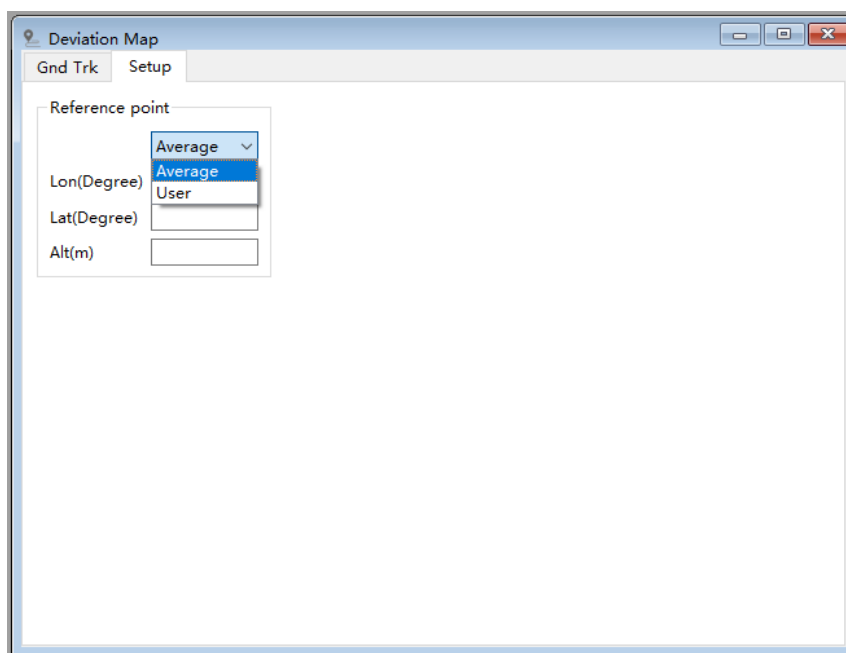


Figure 12: Deviation Map Sub-Window – Setup

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. Attitude Dashboard View Sub-Window

The left part of the “**Attitude Dashboard View**” sub-window presents a 3D-perspective attitude view (GLB 3D View), and the right part is the attitude indicator dashboard. The GLB 3D View enables more intuitive observation of attitude variations. The attitude indicator dashboard consists of pitch, roll and heading gauges, which displays attitude-related data from the **PQMTAR**.



Figure 13: Attitude Dashboard View Sub-Window

2.2.3.8. 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. The heading instrument panel includes the ADR forward/reverse indicator lights.

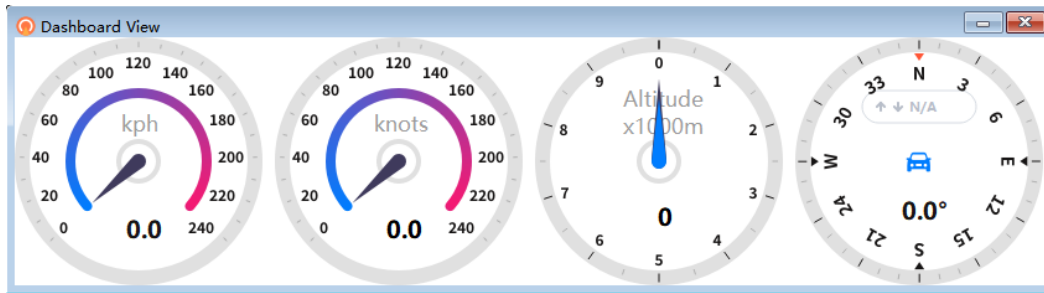


Figure 14: Dashboard View Sub-Window

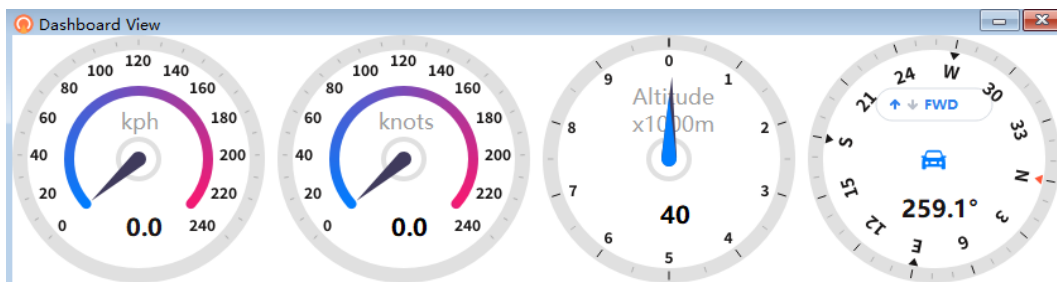


Figure 15: Dashboard View Sub-Window – Forward Indicator Light

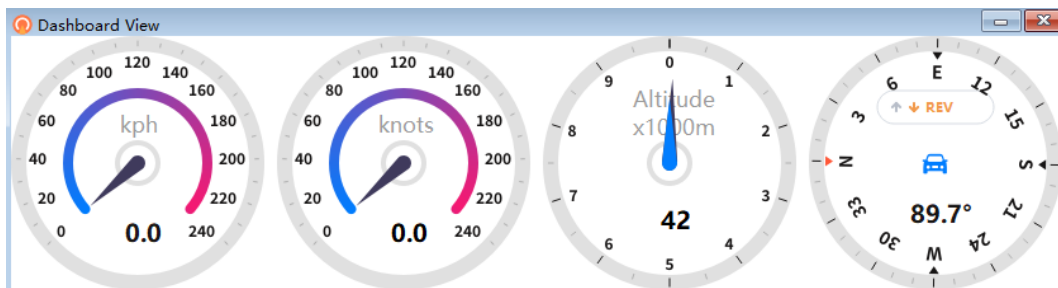


Figure 16: Dashboard View Sub-Window – Reverse Indicator Light

2.2.3.9. 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.

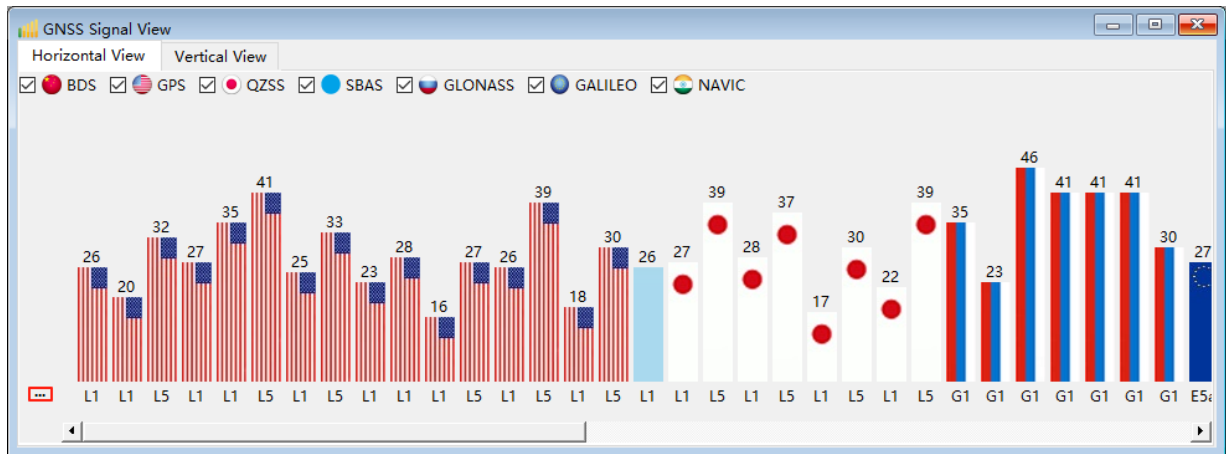


Figure 17: GNSS Signal View Sub-Window – Horizontal View

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

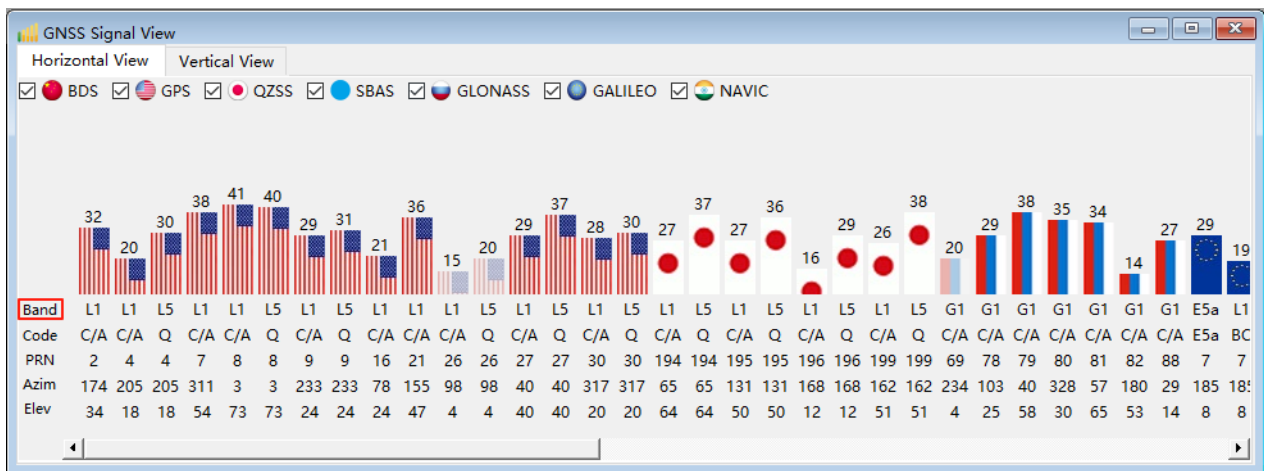


Figure 18: Horizontal View Detailed Information

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 carrier-to-noise ratio (C/N_0) chart, which allows for a more intuitive comparison of the trends of satellite values among different constellations. Additionally, the right side of the chart displays the average C/N_0 values for different satellite frequency bands.

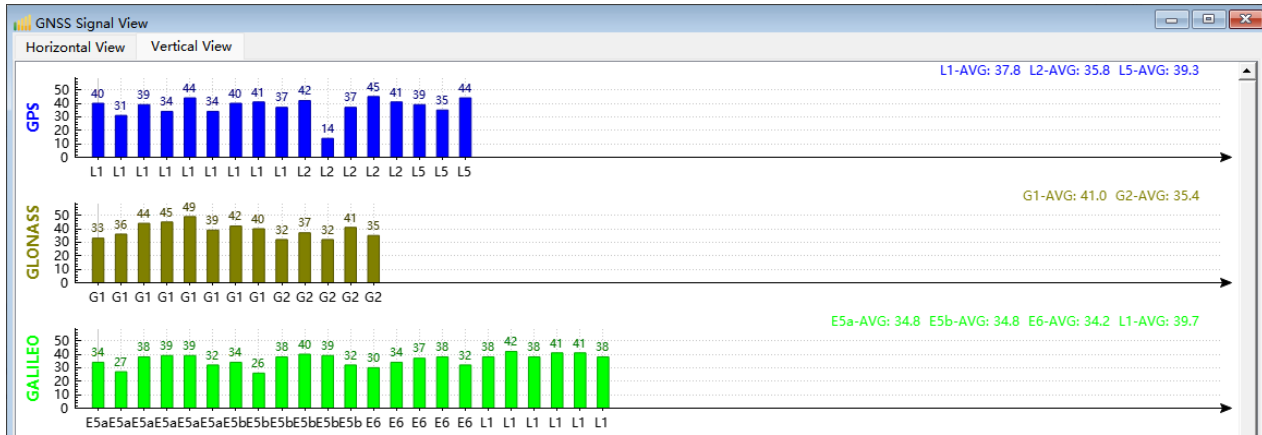


Figure 19: GNSS Signal View Sub-Window – Vertical View

2.2.3.10. IMU View Sub-Window

For a more intuitive display of the real-time data fluctuations, the “**IMU View**” is composed of three curve charts (“**IMU Output View**”, “**IMU1 Raw Data**” and “**IMU2 Raw Data**”) and one sub-window for visual comparison and analysis of IMU data. 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. The data source of “**IMU Monitor**” includes both the IMU raw data and the calibrated IMU data, providing a visual comparison and analysis between the two data sources of each IMU axis.

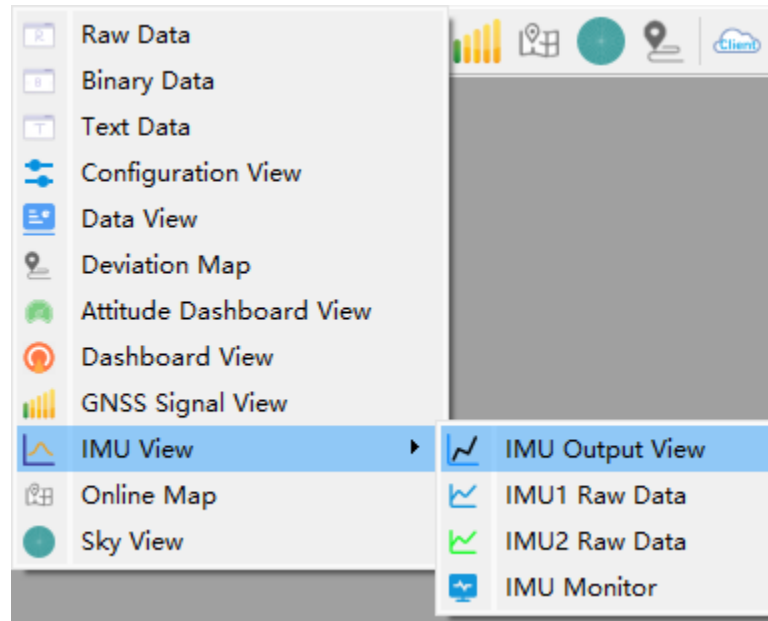


Figure 20: IMU View Drop-down Menu

“**IMU View**” sub-window displays three-axis angular rate (Gyro_X, Gyro_Y, Gyro_Z), three-axis acceleration (Acc_X, Acc_Y, Acc_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 21: 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.

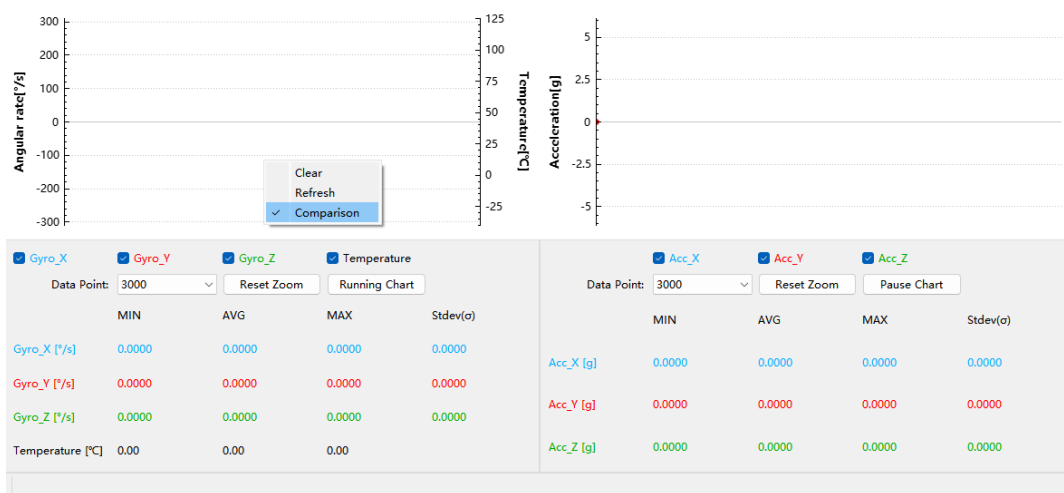


Figure 22: IMU Curve Menu



Figure 23: 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 23: IMU Comparison](#) as an example, are explained as follows:
 - **Gyro_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

The “**IMU Monitor**” sub-window presents three-axis angular rate (Gyro_X, Gyro_Y, Gyro_Z), three-axis acceleration (Acc_X, Acc_Y, Acc_Z), timestamp offset and the temperature data in the form of curves. Each curve includes both the original IMU data and the calibrated IMU data. The “**Statistics**” section is the data statistics area, which contains the maximum, minimum, average, and standard deviation of each IMU data.

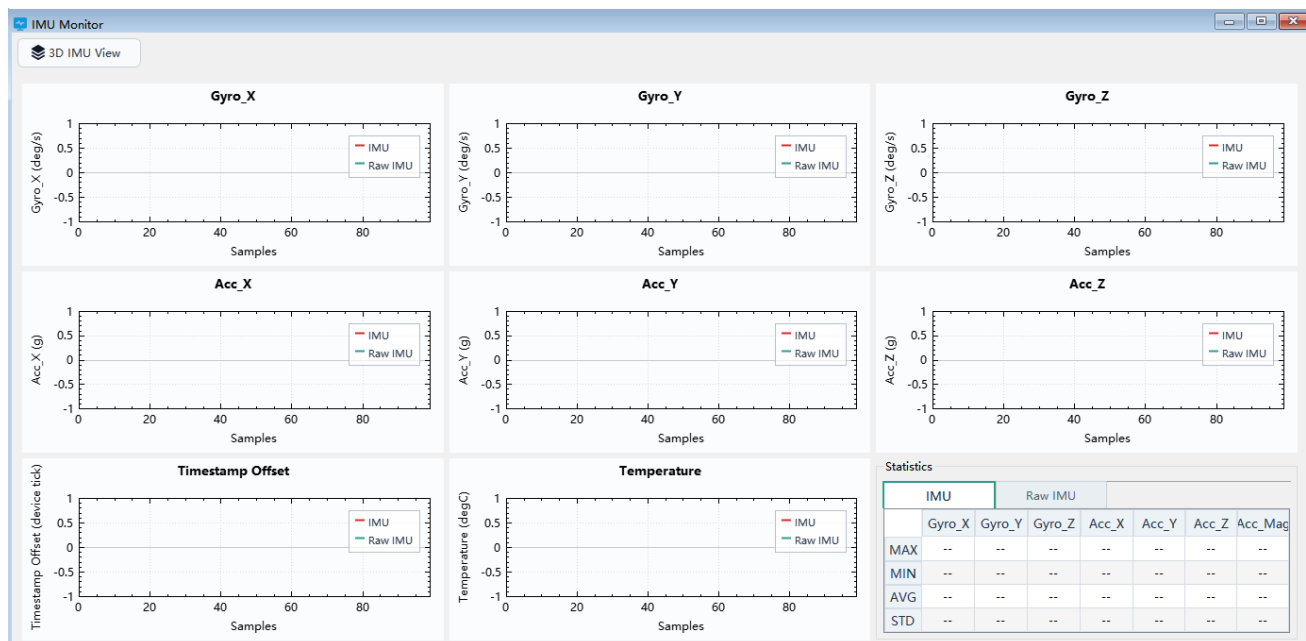


Figure 24: IMU Monitor Sub-Window

NOTE

1. If the IMU is not time-synchronized with the GNSS module, Unix time and UTC time will be converted according to the IMU time instead of the actual time.
2. Currently, only IMU data from the QGC protocol is supported for display.

2.2.3.11. Online Map Sub-Window

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

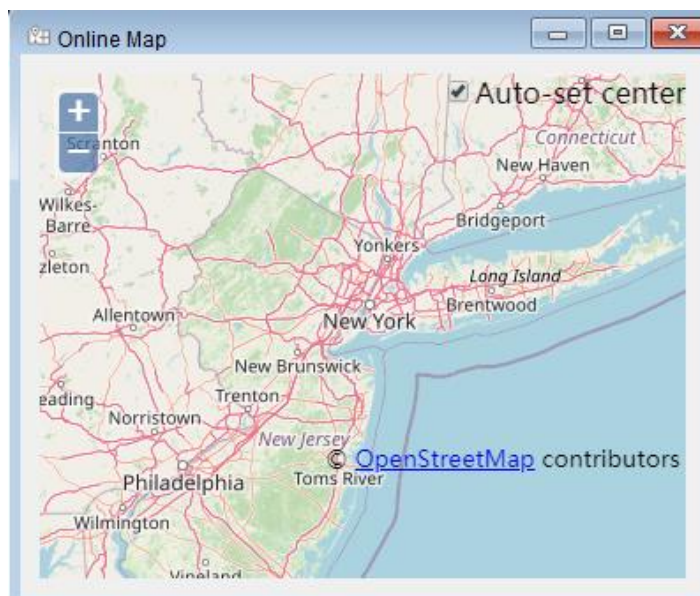


Figure 25: Online Map Sub-Window

2.2.3.12. 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.

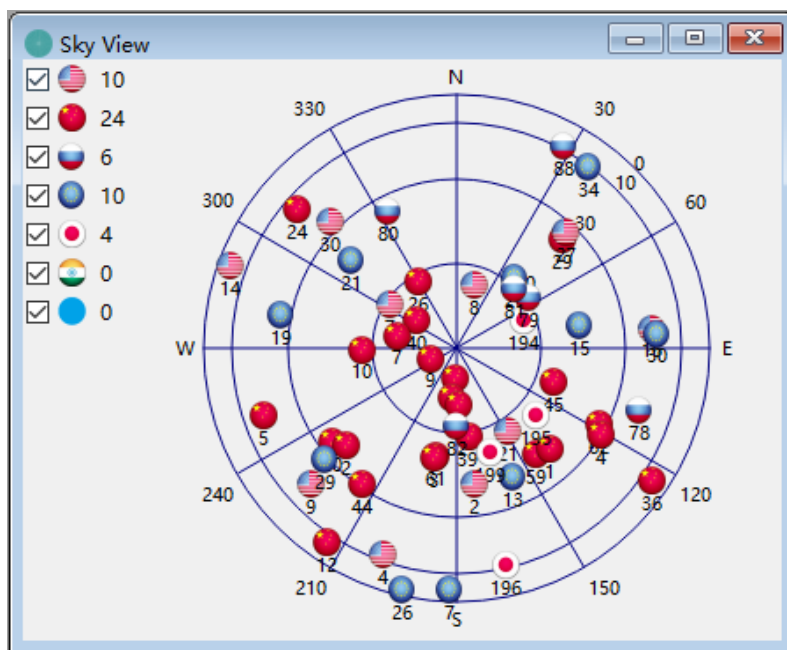


Figure 26: Sky View Sub-Window

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.

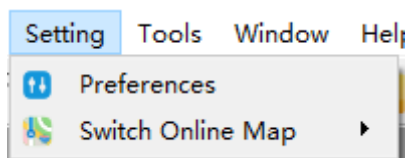


Figure 27: Setting Tab

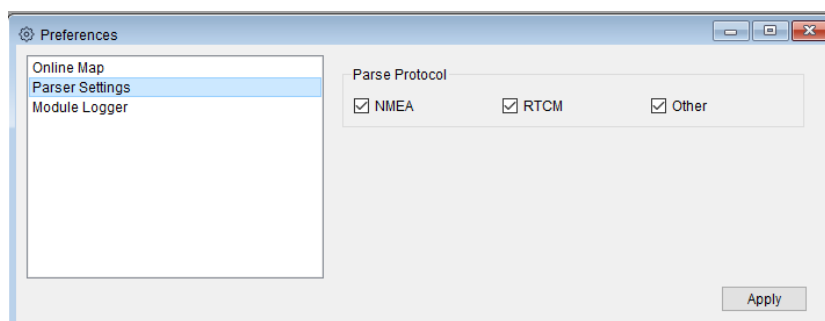


Figure 28: Preferences Sub-Window

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

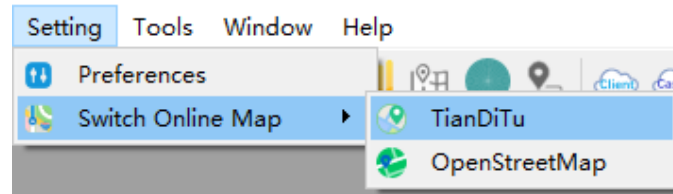


Figure 29: Switch Online Map

2.2.5. Tools Tab

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

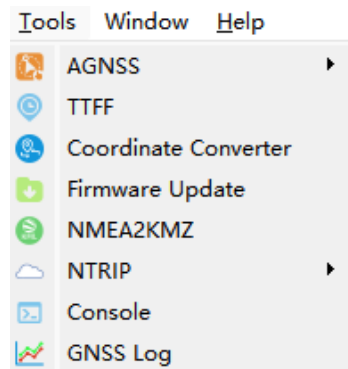


Figure 30: Tools Tab

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 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/HTTP/MQTT servers using two distinct approaches: “**Online AGNSS**” and “**Offline AGNSS**” data downloading. See [Chapter 3.6.1 Download AGNSS Data from Server](#) for details.

2.2.5.2. TTFF Sub-Window

TTFF test is designed to evaluate the time elapsed from receiver activation to the completion of first positioning, which can directly reflect the performance of cold start, warm start, hot start or full cold start of the device. It is essential for optimizing receiver design, validating AGNSS effectiveness, ensuring quality control, and tailoring performance to diverse application scenarios such as automotive, mobile devices, and IoT. TTFF serves as a key metric for assessing positioning efficiency and overall user experience.

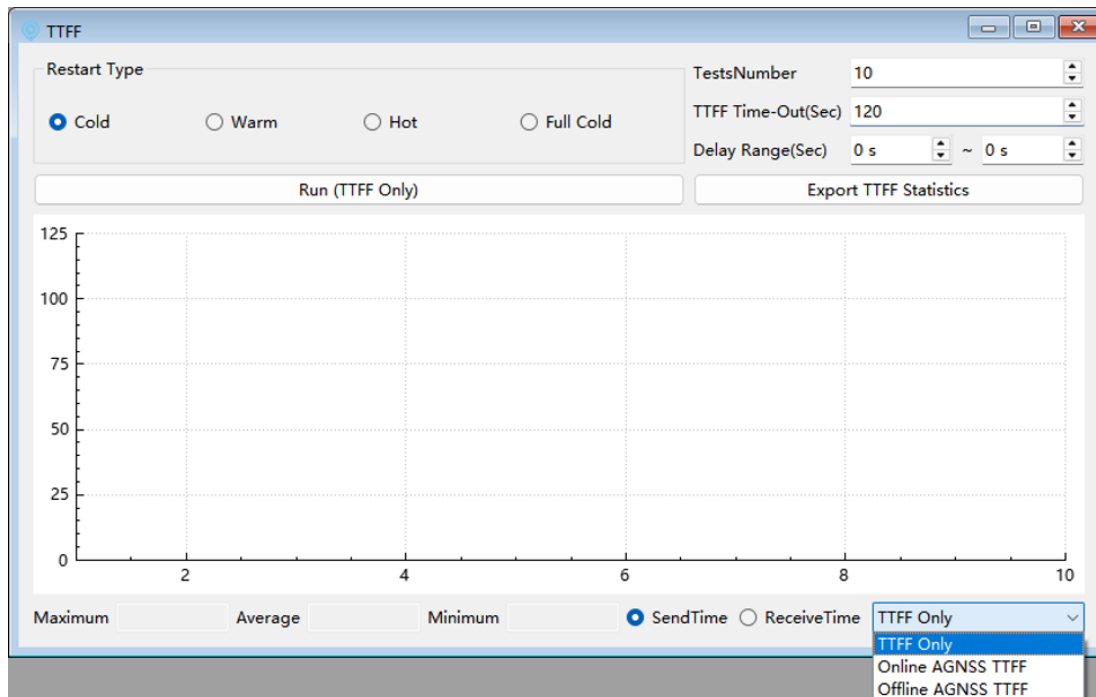


Figure 31: TTFF Sub-Window

The “**TTFF**” sub-window is used to perform TTFF test for a specified number of iterations. Steps for testing TTFF are listed below:

Step 1: Select the desired restart type (cold start, warm start, hot start or full cold start) in “**Restart Type**”.

Step 2: Enter the required number of test iterations in “**Tests Number**”.

Step 3: Set the timeout duration (in seconds) in “**TTFF Time-Out(Sec)**”.

Step 4: Set the range of the random delay time between the two TTFF tests in the “**Delay Range(Sec)**”.

Step 5: Select TTFF calculation method:

- **SendTime:** TTFF is calculated from the moment the cold start, warm start, hot start or full cold start command is sent.
- **ReceiveTime:** TTFF is calculated from the moment the module outputs the first NMEA message.

Step 6: Select TTFF mode:

- Select “**TTFF Only**” mode from the drop-down menu to perform a TTFF test that does not rely on auxiliary data, i.e., only cold start, warm start, hot start or full cold start commands are issued to evaluate the module’s positioning performance under different initial states.
- Select “**Online AGNSS TTFF**” mode from the drop-down menu. Once entered, the system uses pre-injected auxiliary data, such as online ephemeris, UTC time and position information to conduct TTFF test. The “**Online AGNSS TTFF**” mode can be used to indicate whether the TTFF sub-window is in online AGNSS ephemeris injection mode.
- Select “**Offline AGNSS TTFF**” mode from the drop-down menu. Once entered, the system uses pre-injected auxiliary data, such as offline ephemeris, UTC time and position information to conduct TTFF test. The “**Offline AGNSS TTFF**” mode can be used to indicate whether the TTFF sub-window is in offline AGNSS ephemeris injection mode.

Step 7: Click “**Run**” to start the cyclic injection process.

Step 8: After the cyclic injection completes, click “**Export TTFF Statistics**” to generate a data table summarizing the current test results.

2.2.5.3. 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:

Figure 32: Coordinate Converter Sub-Window – Enter Values

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

The screenshot shows the 'Coordinate Converter' sub-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 selection: 'LLA (Deg)', 'LLA (Deg,Min)' (which is selected), 'LLA (Deg,Min,Sec)', and 'ECEF(XYZ)'. Below these are four input sections. The 'LLA (Deg)' section has fields for Lat(D) [31.82211868], Lon(D) [117.11618303], and Alt(m) [129.40]. The 'LLA (Deg,Min)' section has fields for Lat (31), D (49.327121), M, Lon (117), D (06.970982), M, and Alt (129.40) m. The 'LLA (Deg,Min,Sec)' section has fields for Lat (31), D (49), M (19.62726000), S, Lon (117), D (6), M (58.25892000), S, and Alt (129.40) m. The 'ECEF(XYZ) [Unit:m]' section has fields for X [-2472510.27], Y [4828345.35], and Z [3343756.21]. At the bottom right are 'Clear' and 'Convert' buttons.

Figure 33: Coordinate Converter Sub-Window – Convert Values

- 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.

The screenshot shows the 'Finding Coordinate Distance' sub-window. It has three tabs: 'Coordinate Converter', 'Finding Coordinate Distance' (which is active), and 'GNSS Coordinate Transformation'. The 'Starting Point [°]' section has fields for latitude [31.84468504] and longitude [117.10025436]. The 'End Point [°]' section has fields for latitude [31.82159847] and longitude [117.11529996]. The 'Answer [KM]' section has a field displaying [2.93433168]. At the bottom right are 'Calculate' and 'Clear' buttons.

Figure 34: Finding Coordinate Distance Sub-Window

3. In the “**GNSS Coordinate Transformation**” Sub-Window:
 - Directly copy and paste the latitude and longitude coordinates (in ddmm.mmmmmm format) output by standard NMEA message (such as **RMC**, **GGA**) into the corresponding input field of “**WGS-84 – Degrees_Decimal Minutes**”, and then click “**Convert_Correct**” to convert the data into the format listed below:
 - WGS-84 – Decimal Degrees
 - WGS-84 – DMS Format
 - GCJ-02 (Mars Coordinate System)
 - BD-09 (Baidu Coordinate System)

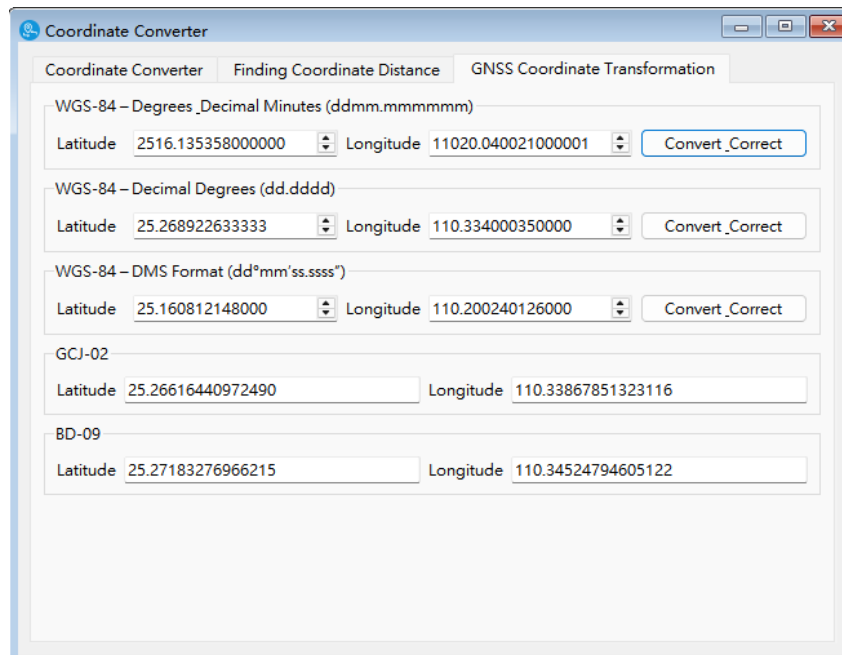


Figure 35: GNSS Coordinate Transformation Sub-Window

NOTE

The tool also supports converting data in the “**WGS-84 – Decimal Degrees**” and “**WGS-84 – DMS Format**” formats to other data formats within this sub-window.

2.2.5.4. 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.

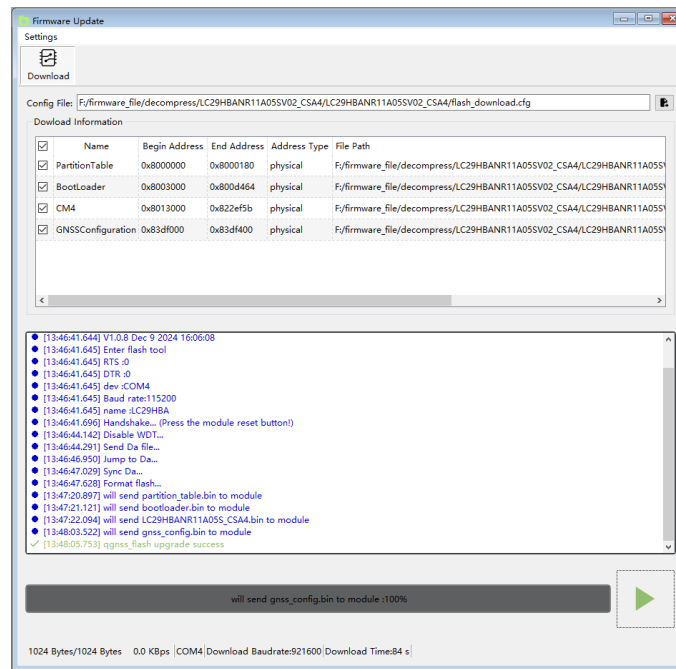


Figure 36: Firmware Update Sub-Window

2.2.5.5. NMEA2KMZ Sub-Window

The “NMEA2KMZ” sub-window is used to convert the NMEA log to a KMZ format file.

- Click “Add NMEA Files” to select the NMEA file to be converted in the pop-up window.
- Click the color checkbox under the “Arrow Colors” column to set the colors for points in different positioning mode:
 - **3D**: Standard positioning (SPS) mode
 - **SBAS**: Differential GPS positioning mode
 - **RTD**: Float RTK mode
 - **RTK**: Fixed RTK mode
 - **INS**: Estimated (dead reckoning) mode.
 - **Line**: Positioning trajectory
- Click “Generate KMZ” to convert the NMEA log to a KMZ format file.

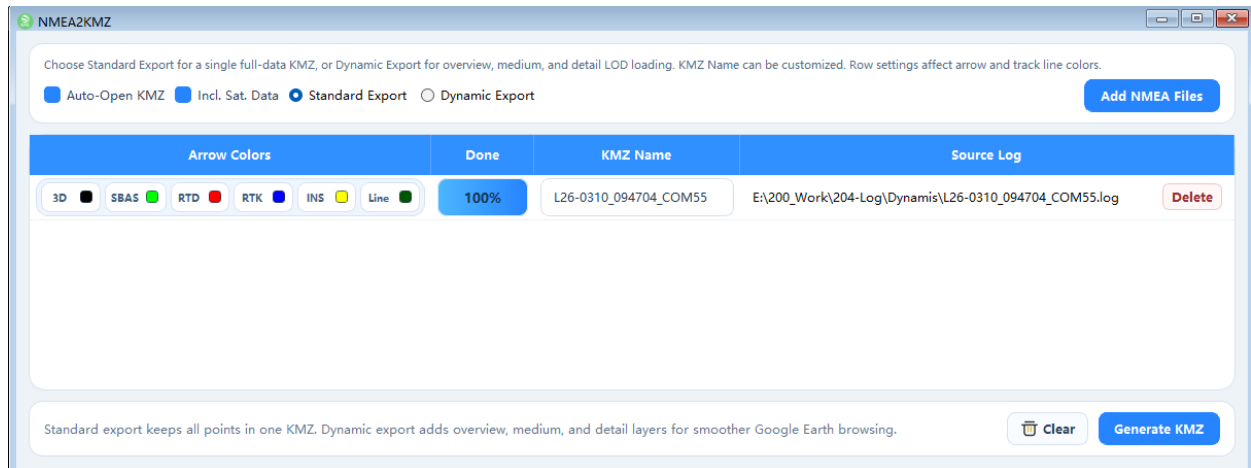


Figure 37: NMEA2KMZ Sub-Window

NOTE

1. After checking "**Auto-Open KMZ**" the generated KMZ file can be directly opened with Google Earth on your computer.
2. After checking "**Incl. Sat. Data**", satellite data will be displayed at points in Google Earth.
3. After selecting "**Standard Export**", a single KMZ file containing all data points will be generated. After selecting "**Dynamic Export**", a multi-layered KMZ file will be created with overview, intermediate and detailed layers. The corresponding layer will be automatically loaded based on the zoom level in Google Earth for smoother browsing.

2.2.5.6. NTRIP Sub-Window

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

2.2.5.7. Console Sub-Window

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

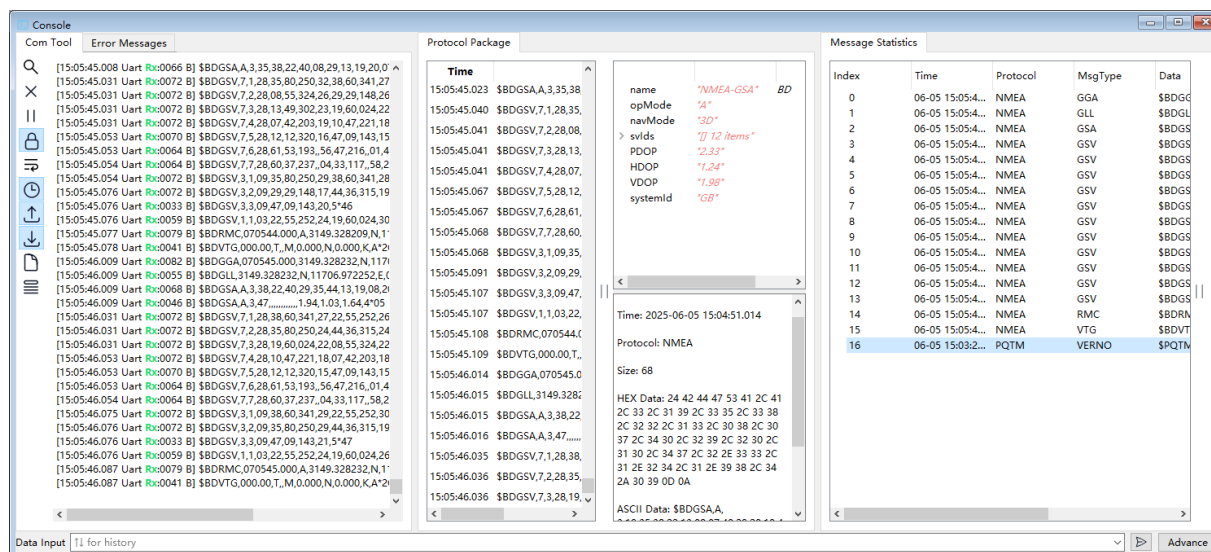


Figure 38: Console Sub-Window

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.

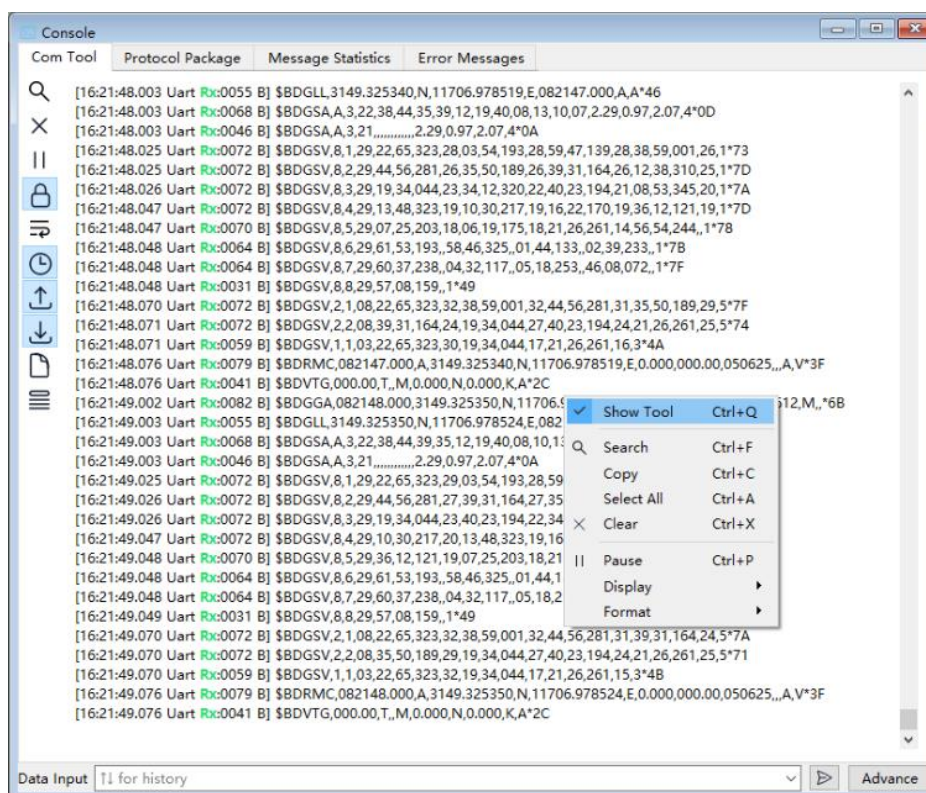


Figure 39: Com Tool Context Menu

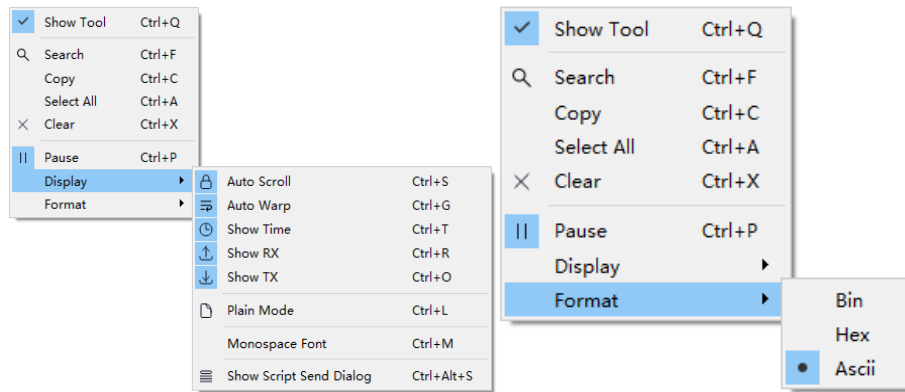


Figure 40: Details on Com Tool Menu

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
	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.

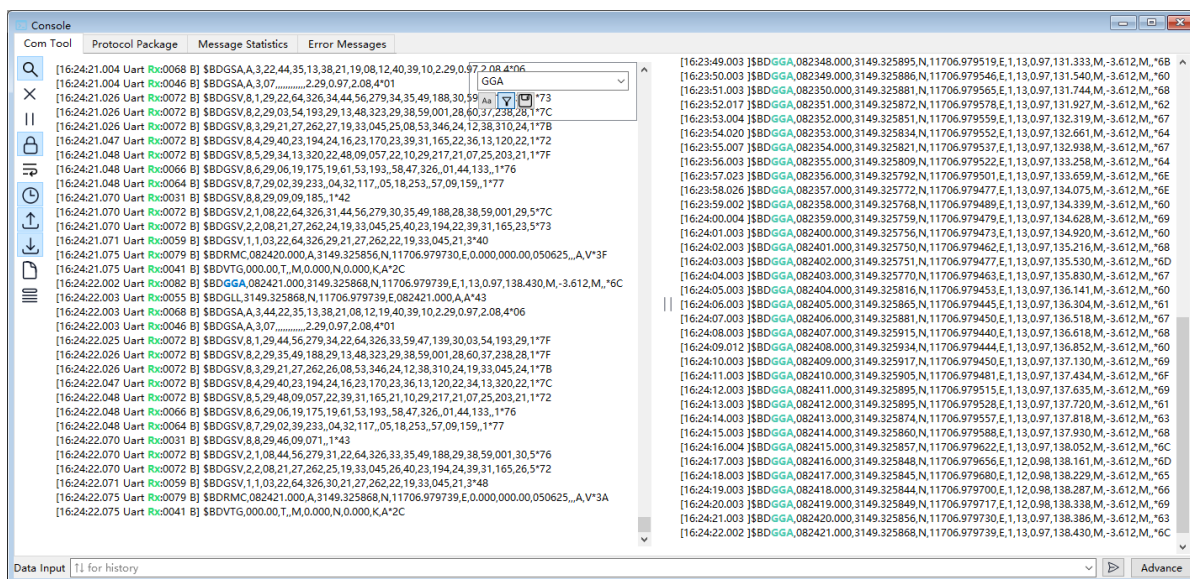


Figure 41: Com Tool Data Filtering

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.

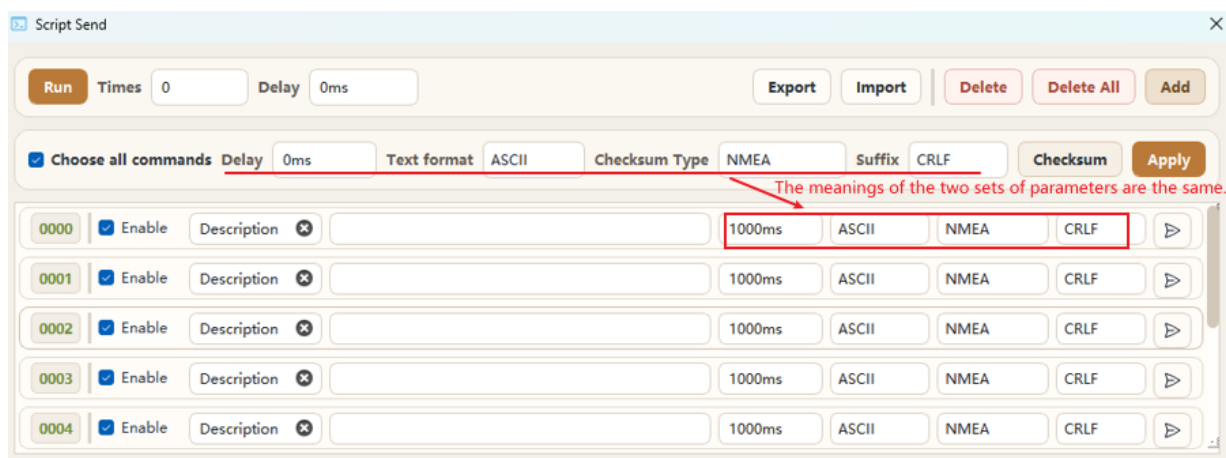


Figure 42: Script Console

Introduction to the “Script Send” window:

- **Choose all commands:** Tick this checkbox to check the “Enable” checkboxes of all command lines in the command list. At this time, you can configure the parameters related to all commands in one batch (such as delay time, data format, checksum type and suffix information).
- **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.
 - **QGC:** Add QGC/VNC 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".
 - **LF CR:** Line feed carriage return. Add suffix "\n\r".
- **Checksum:** Calculate the checksum of the input command in the command box.
- **Apply:** Apply the configured parameters to all commands to be sent in the command box.
- **Description:** Input data usage description for quick identification when accessing historical scripts.

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.

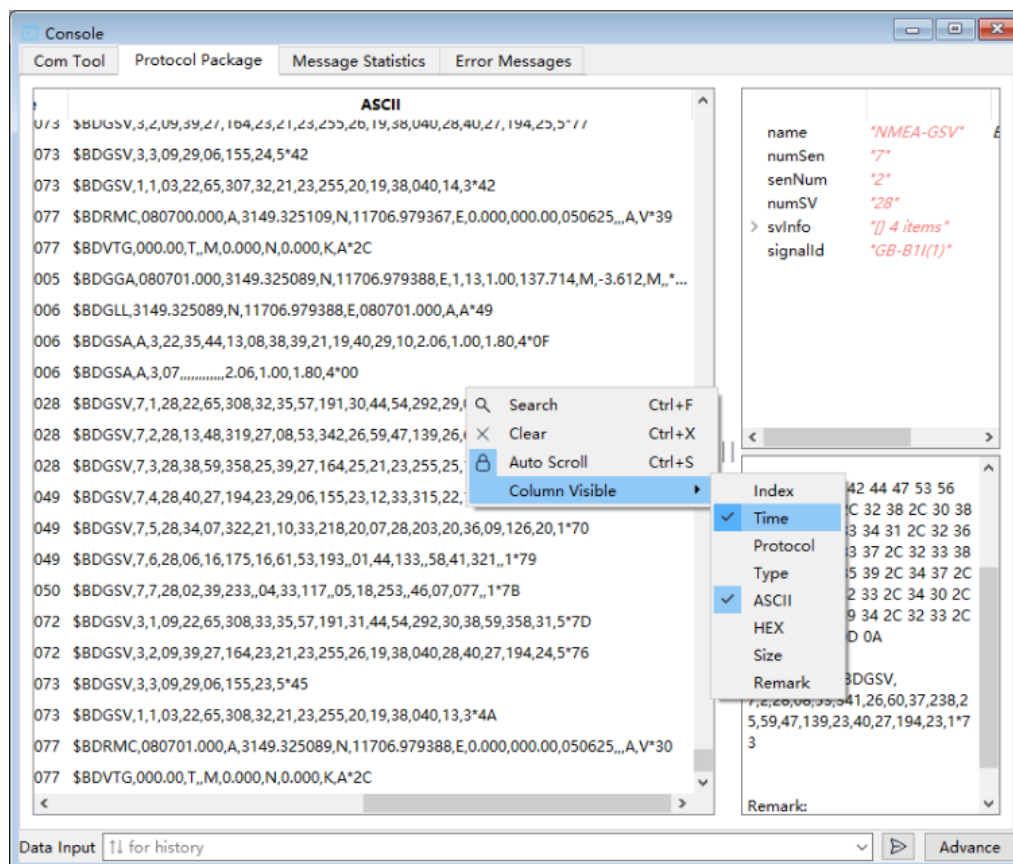


Figure 43: Protocol Package

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 44: 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.

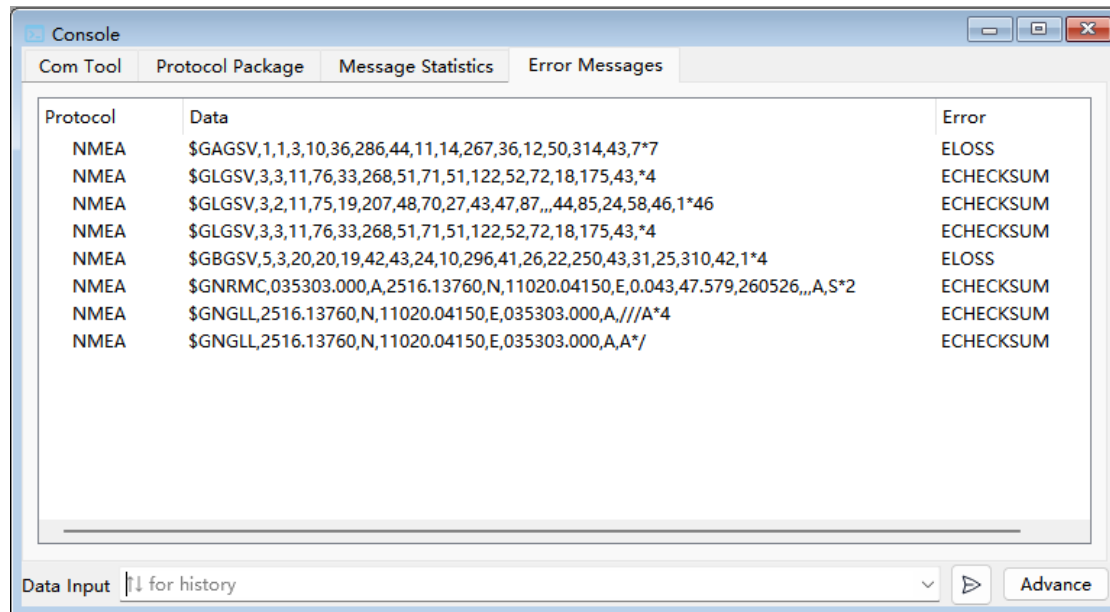


Figure 45: Error Messages

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:

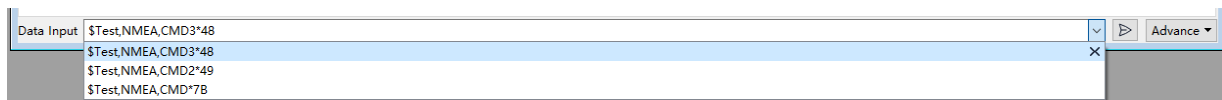


Figure 46: Data Input

2.2.5.8. GNSS Log Sub-Window

The “GNSS Log” displays a line chart of satellite carrier-to-noise ratio (C/N_0), number of visible satellites, number of satellites in use, dilution of precision, and presents satellite data in the NMEA message.

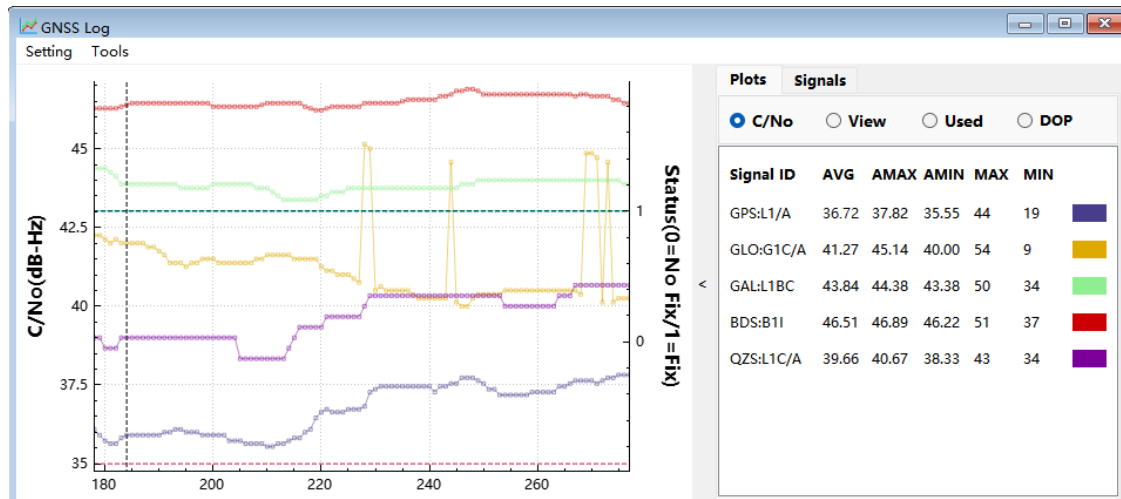


Figure 47: GNSS Log Sub-Window

1. GNSS Log Introduction (consisting of “Plots” and “Signals” options on the right side):

- In the “Plots” option, the system displays the UTC time output by the serial port in real time, along with four key graphs: satellite carrier-to-noise ratio (C/N_0), number of visible satellites, number of satellites in use and dilution of precision. Below each graph, statistical data including the extreme values and average values of the corresponding signal frequency bands (e.g., L1, L2, L5, etc.) are displayed. Each data point in the satellite carrier-to-noise ratio (C/N_0) graph represents the average C/N_0 value of all relevant channels in that frequency band within a single frame of NMEA data. These metrics enable users to comprehensively evaluate the module’s satellite signal acquisition and tracking performance over different time periods, as well as the stability and fluctuation characteristics of signal quality.
 - “AMAX/AMIN” denotes the maximum and minimum values of the frame-averaged C/N_0 for the signal frequency band across multiple data frames, which correspond to the peak and trough values displayed in the line graph (this metric is only available in the C/N_0 graph).
 - “MAX/MIN” refers to the maximum and minimum C/N_0 values achieved by an individual satellite in the signal frequency band within a single data frame.
- “Signals” displays or hides the curves.

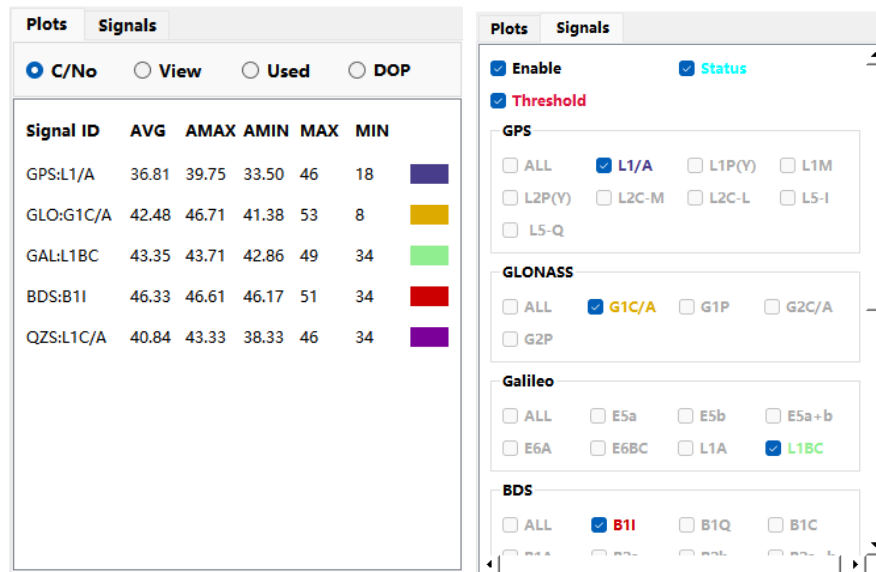


Figure 48: GNSS Log Right Tab

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.

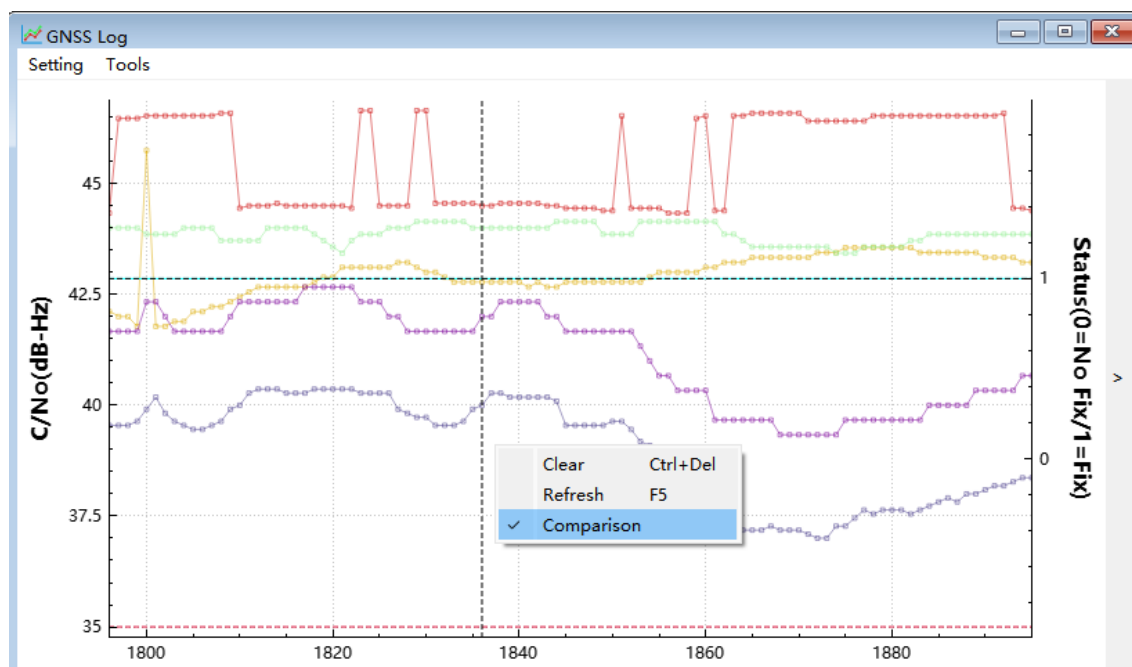


Figure 49: Curve Menu

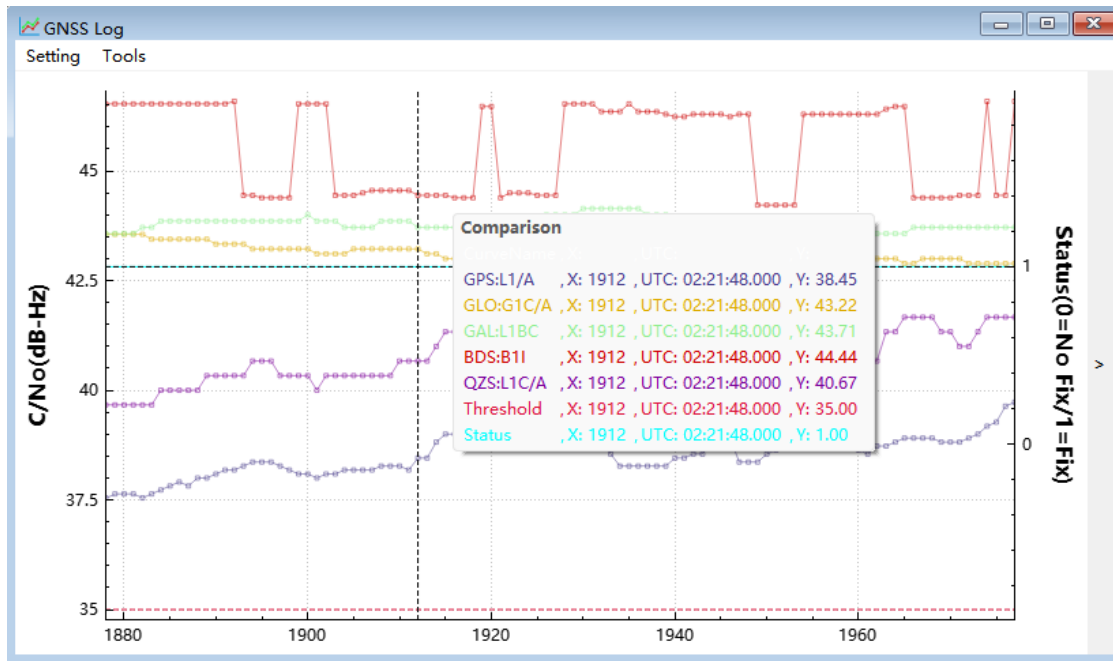


Figure 50: GNSS Log Comparison

2. Initiate Log File Statistical Analysis:

Step 1: Click  to open the “Device Information”.

Step 2: Click  to select the target log file.

Step 3: Click “Specialized Analysis Mode” and log file statistical analysis can be initiated.

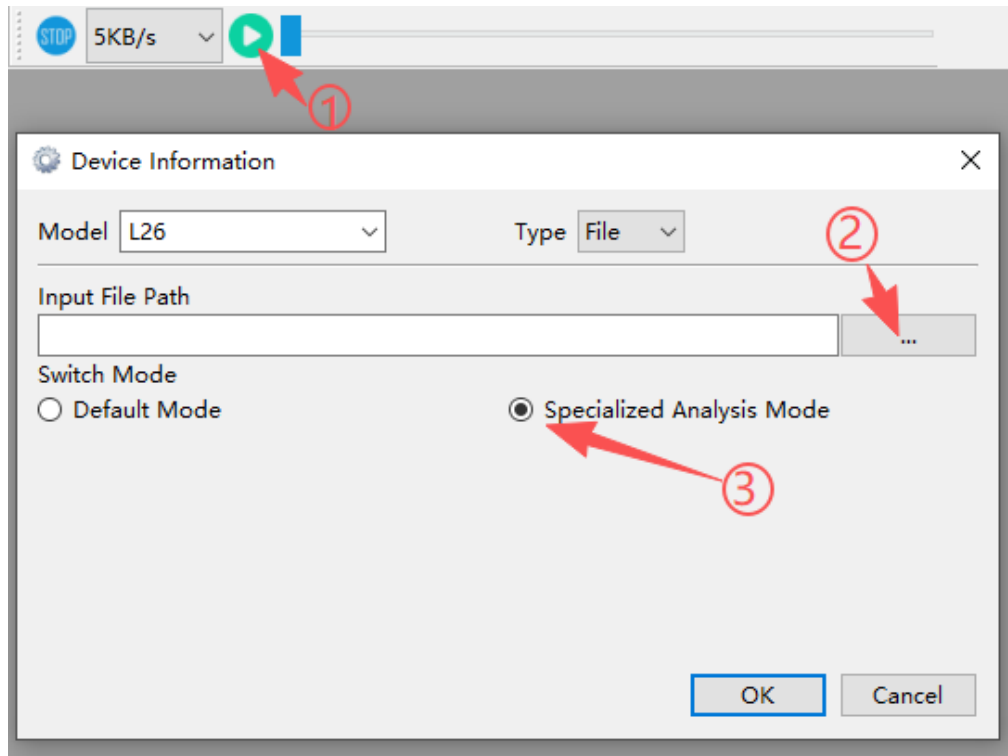


Figure 51: Device Information – Specialized Analysis Mode View

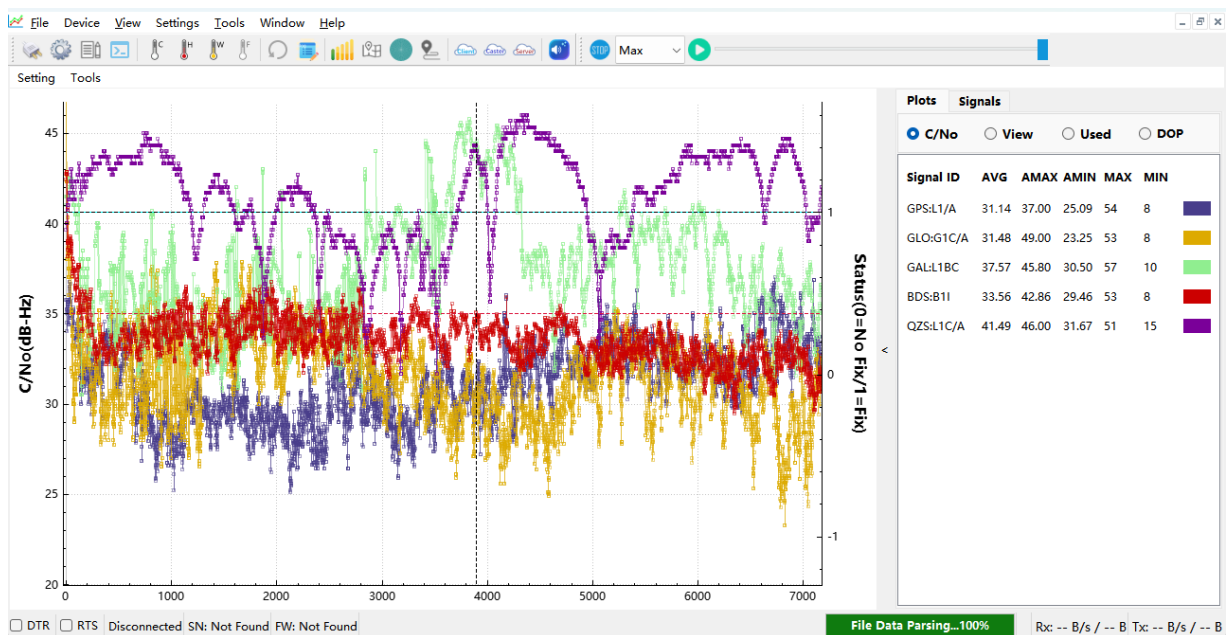


Figure 52: GNSS Log – Specialized Analysis Mode View

3. Filter the Data Displayed on the Interface

Step 1: Click “Filter Options” under the “Setting” option to open the “Filter Options” pop-up window.

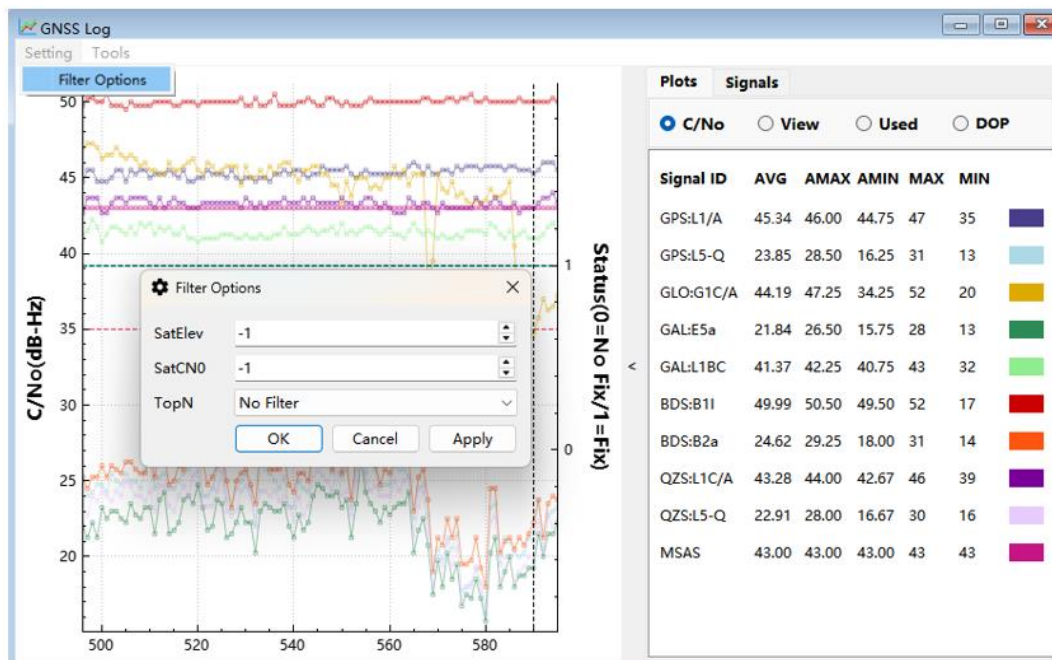


Figure 53: GNSS Log – Filter Options View

Step 2: Configure satellite filtering parameters in the "Filter Options" pop-up window:

- Enter a satellite elevation threshold in the "**SatElev**" input box, the tool will retain data with elevation greater than this threshold from newly received data.
- Enter a C/N_0 threshold in the "**SatCNO**" input box, the tool will retain data with C/N_0 higher than this threshold from newly received data.
- Select a target value from the "**TopN**" drop-down box, the tool will retain data of the top N satellites with the best C/N_0 from newly received data.

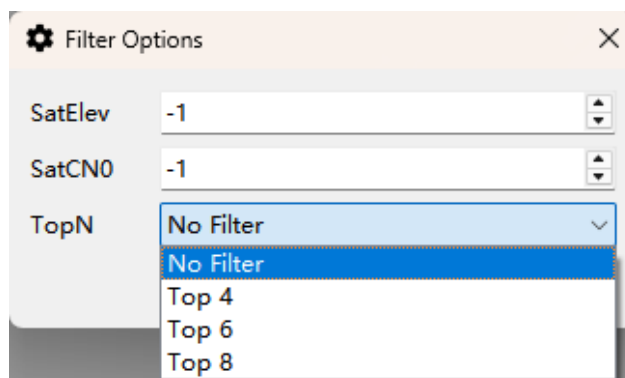


Figure 54: Filter Options – TopN Dropdown View

Step 3: Click “**Apply**” button, and the data displayed on the interface will be filtered according to the configured satellite elevation threshold, C/N₀ threshold and the parameter of top N satellites with optimal C/N₀. Click “**Cancel**” to close the “**Filter Options**” pop-up window after filtering. Alternatively, click the “**OK**” directly to apply data filtering and automatically close the “**Filter Options**” pop-up window after data filtering.

4. Generate a C/N₀ Value Report in HTML Format:

Step 1: Click “**NMEA to HTML**” under the “**Tools**” option to open the “**NMEA to HTML**” interface.

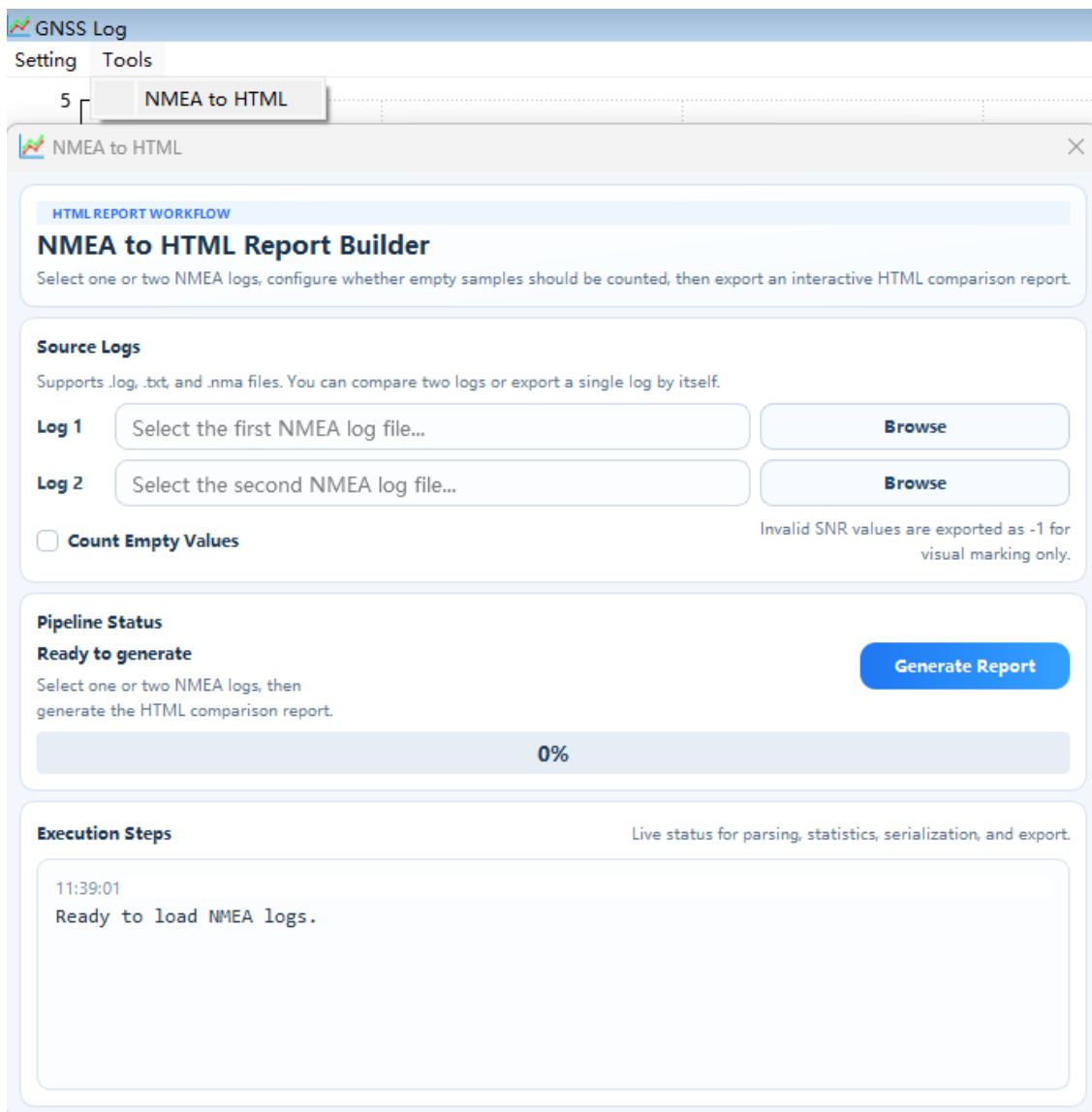


Figure 55: NMEA to HTML Sub-Window

Step 2: Click “**Browse**” to select the target Log file. You can choose a single Log file or two Log files for comparison.

Step 3: Check “**Count Empty Values**” and it will mark the empty values (i.e., the satellite C/N₀ values are empty) as “-1” for display.

Step 4: Click “**Generate Report**” to generate the HTML format report. The report shows the changes of C/N₀ values of different satellites in different frequency bands.



Figure 56: HTML Format Report

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 four pre-set interface layouts.

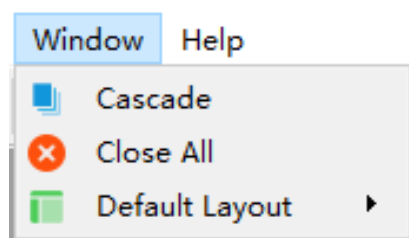


Figure 57: Window Tab

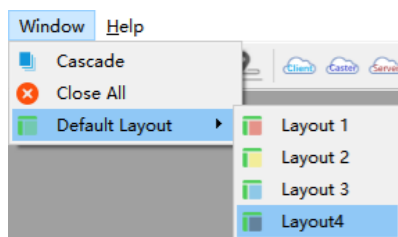


Figure 58: Default Layout Tab Menu

Display all the sub-windows in a cascade pattern.

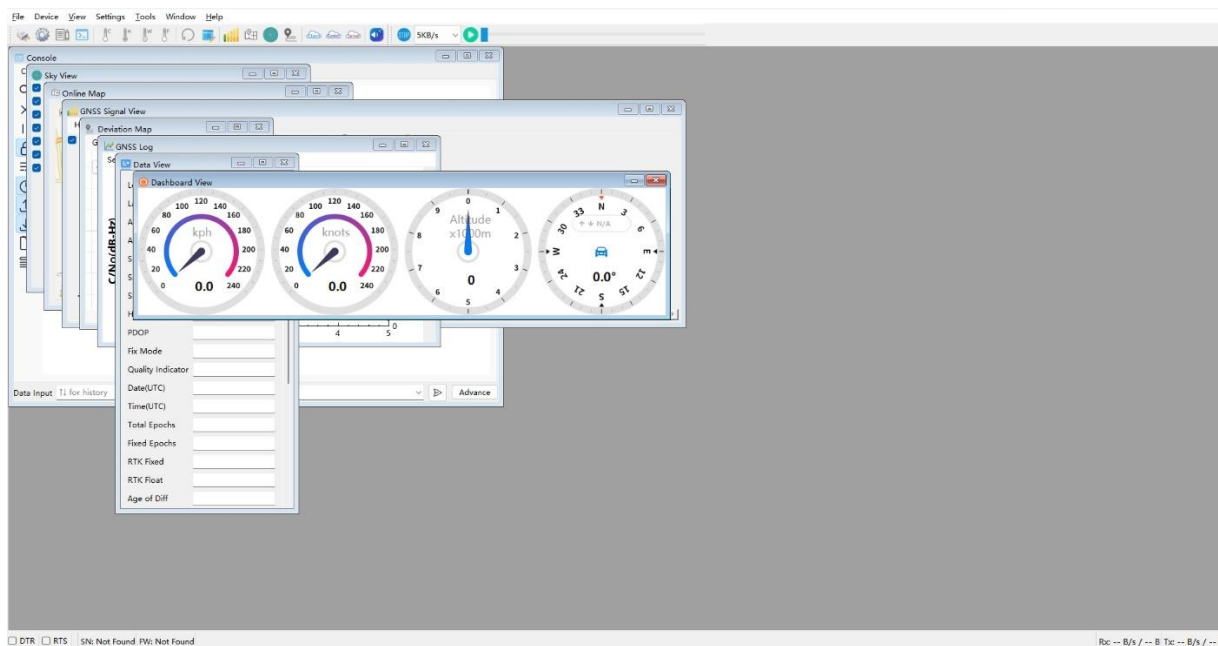


Figure 59: Cascade Window

Closes all windows.

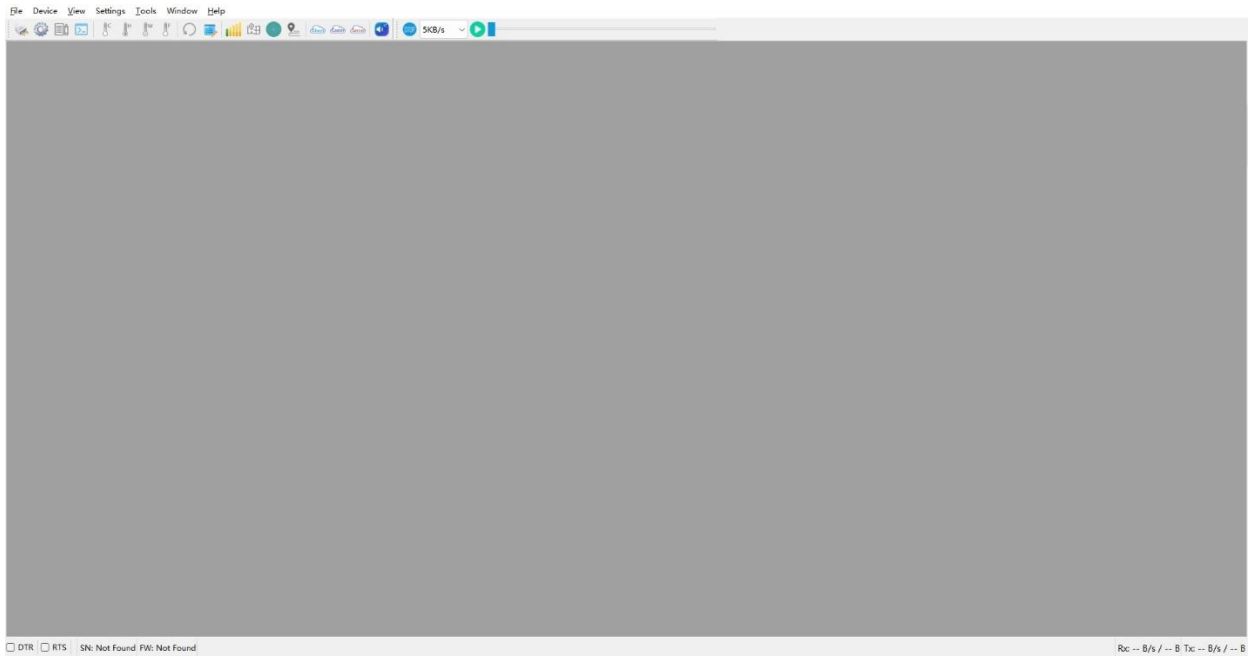


Figure 60: Close All Windows

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

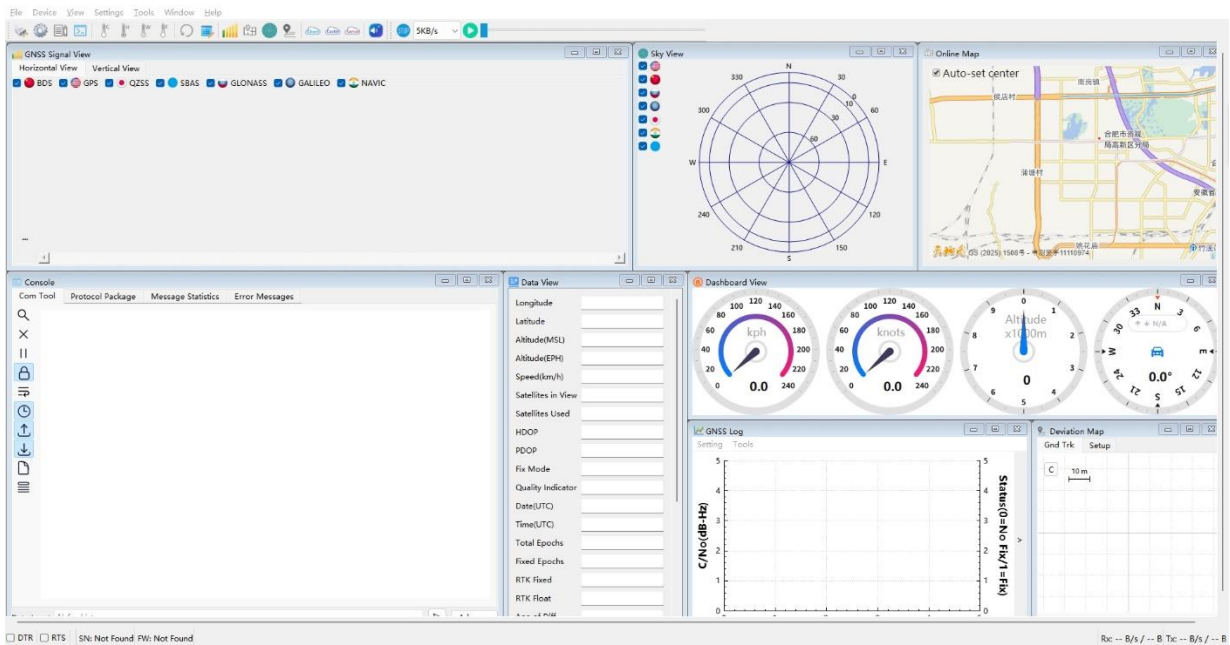


Figure 61: Default Layout – Layout 1

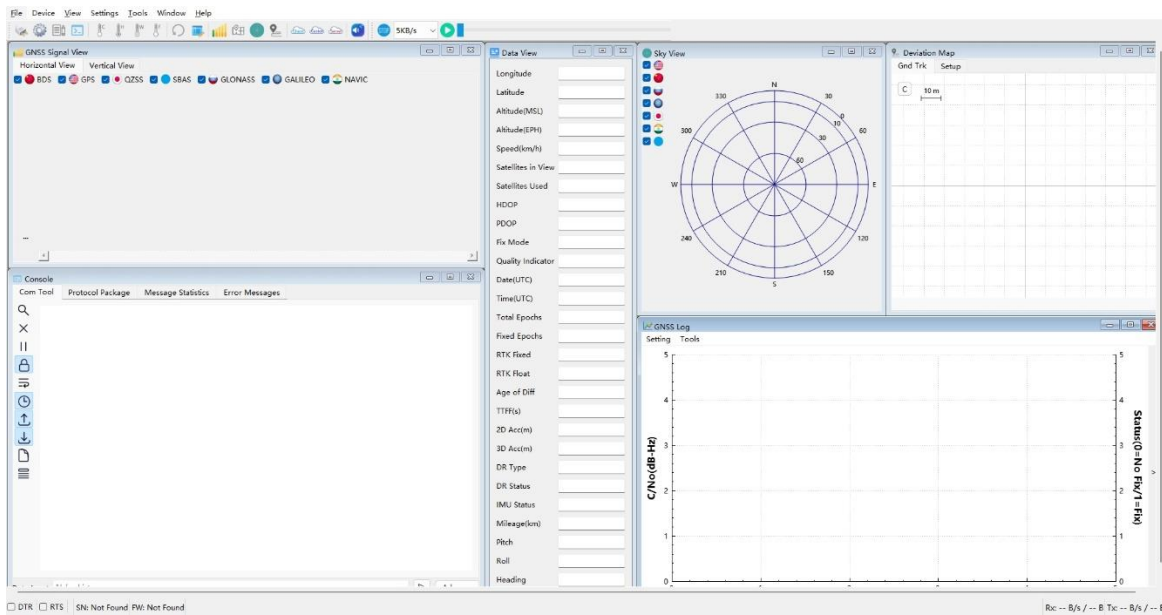


Figure 62: Default Layout – Layout 2

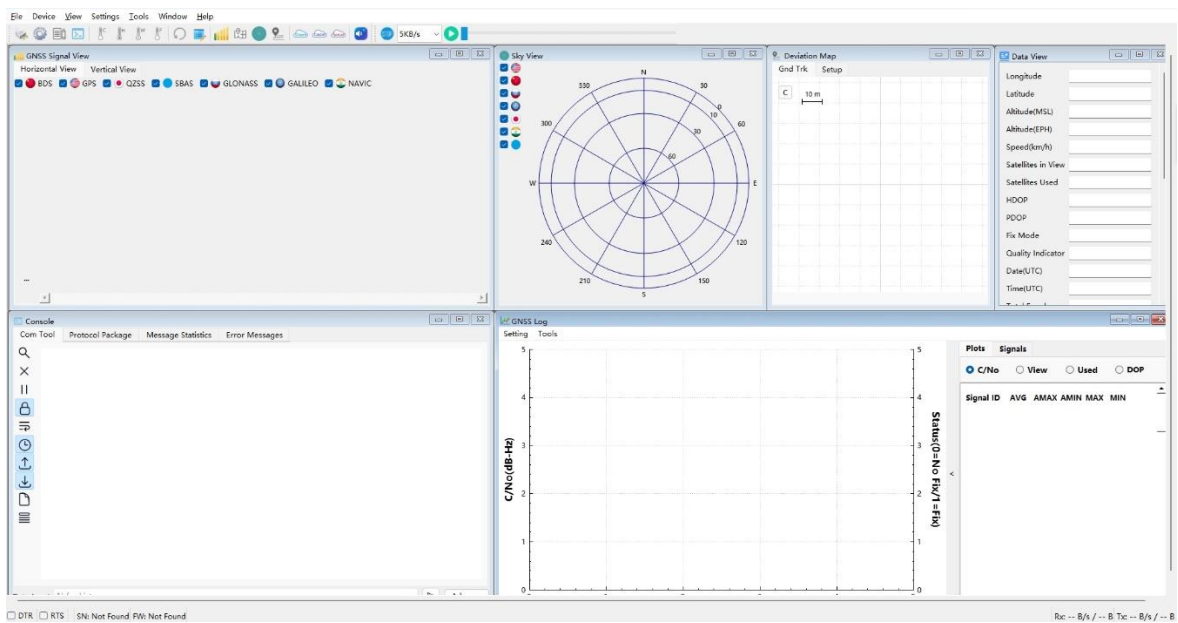


Figure 63: Default Layout – Layout 3

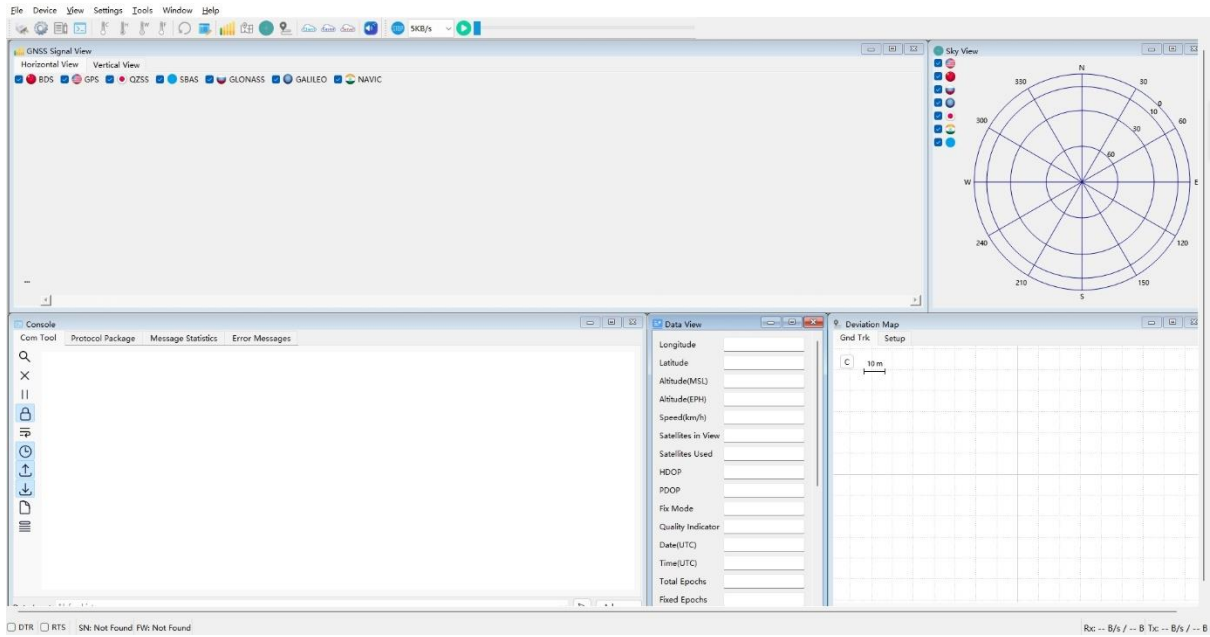


Figure 64: Default Layout – Layout 4

2.2.7. Help Tab

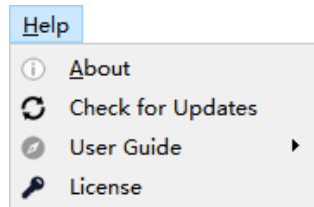


Figure 65: Help Tab

2.2.7.1. About Sub-window

Display QGNSS version and component version and compile time.

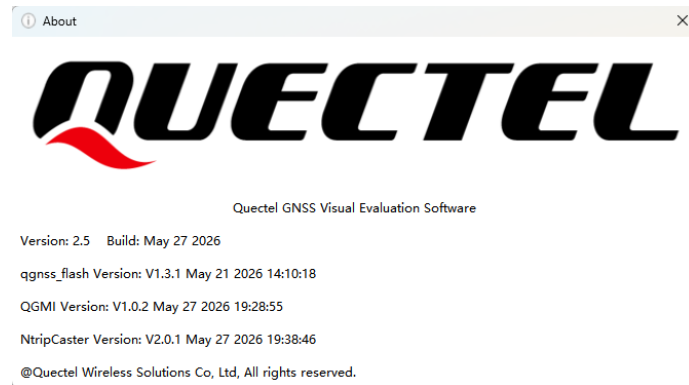


Figure 66: About Sub-Window

2.2.7.2. Check for Updates Sub-window

Clicking “**Check for Updates**”, the system automatically verifies whether the current tool is up to date. If it is already the latest version, a notification window appears confirming that you are using the latest version. If a newer version is available, the application will automatically open a web browser to guide you to the download page for the latest QGNSS tool.

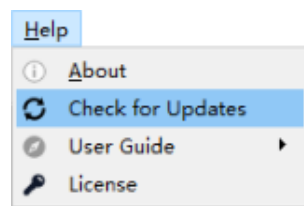


Figure 67: Check for Updates Sub-Window

2.2.7.3. User Guide Sub-window

Click “User Guide” and select “Chinese” or “English” to automatically open the QGNSS user guide in the corresponding language.

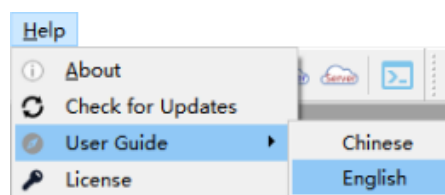


Figure 68: User Guide Sub-Window

2.2.7.4. 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.

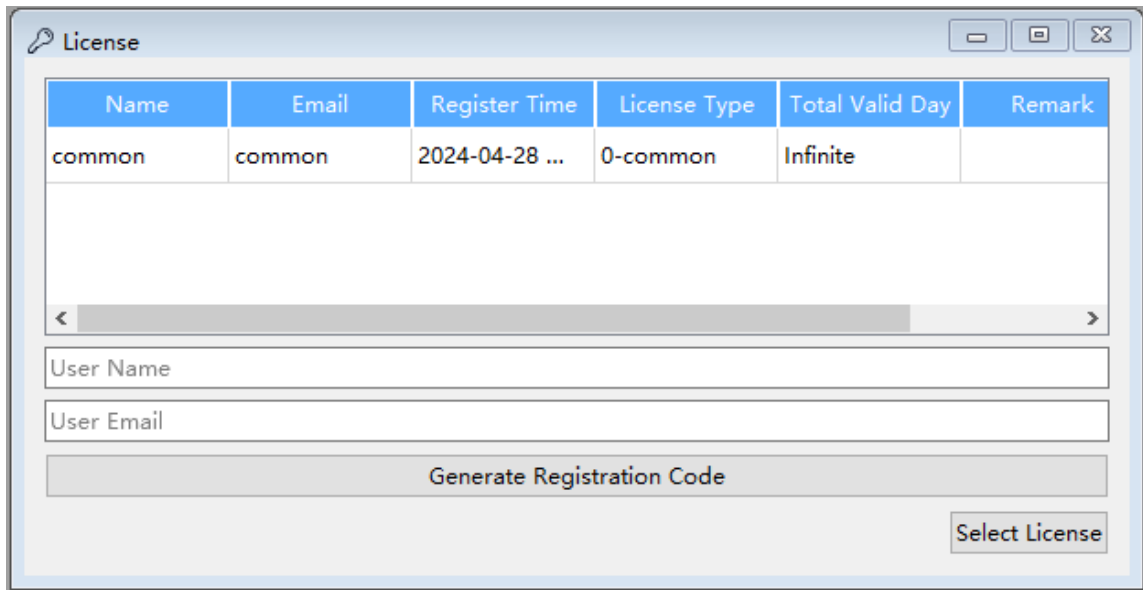


Figure 69: License Sub-Window

2.3. Tool Bar

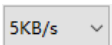
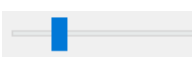
Tool bar can be used for quick access to common operations.



Figure 70: Tool Bar

Table 4: Description of Tool Bar Functions

Icon	Function	Description
	Connect	Connect/disconnect serial port
	Set Device Information	Open the “ Device Information ” window to set the relevant device.
	Show Logfile in Explorer	Open the folder containing the saved log file(s)
	Console	Open the “ Console ” sub-window
	Cold Start	Send a cold start command
	Hot Start	Send a hot start command
	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
	Voice Alert	Open “ Integrated Voice Alerts ” sub-window
	Stop Play	Stop log play

Icon	Function	Description
	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. Receiver/TCP Server Connection

3.1.1. 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 71: Open Device Information Window

Step 3: Select the module and choose “**Serial**” option in the “**Type**” drop-down box.

Step 4: Set serial port parameters. The “**Enable Auto Baud Detection**” checkbox is ticked by default for automatic baud rate detection. You can untick it and manually select the baud rate.

Step 5: Click the “**OK**” button.

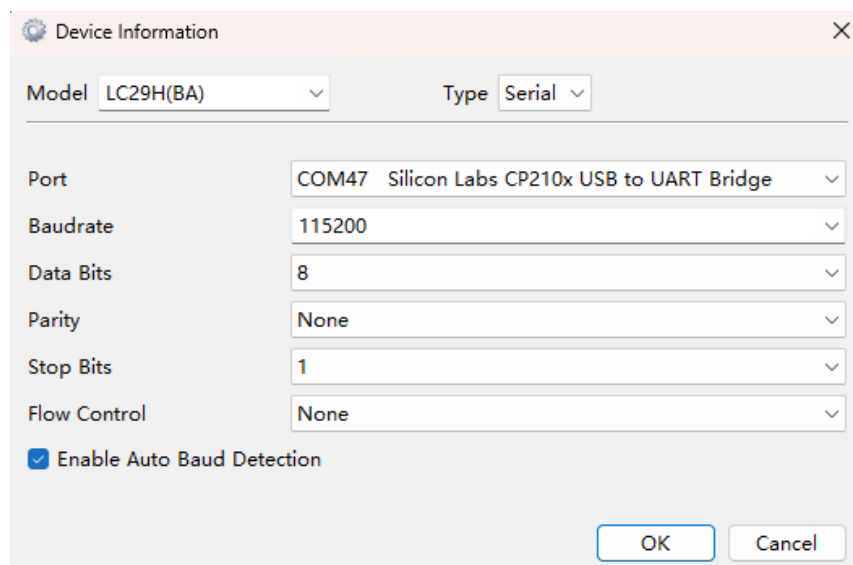


Figure 72: Serial Port Configuration Dialog

3.1.2. Connect to TCP Server

Follow the below steps to connect the QGNSS tool to TCP server:

Step 1: Run the QGNSS tool.

Step 2: Click the “**Set Device Information**” button on the tool bar to open the “**Device Information**” window, as shown in [Figure 71: Open Device Information Window](#).

Step 3: Select the module and choose “**TCP**” option in the “**Type**” drop-down box.

Step 4: If there are no historical TCP server connection records, proceed to **Step 5**. If historical TCP server connection records exist, you may skip **Step 5**, and directly click the “**Recent**” dropdown box to select a previously connected TCP server, then click the “**OK**” button. The QGNSS tool will establish a connection with the selected TCP server.

Step 5: Enter the TCP server address in the “**TCP Host**” input box; enter the TCP server port number in the “**TCP Port**” input box; set the connection timeout in “**Connect Timeout**”, and click the “**OK**” button. The QGNSS tool will establish a connection with the corresponding TCP server.

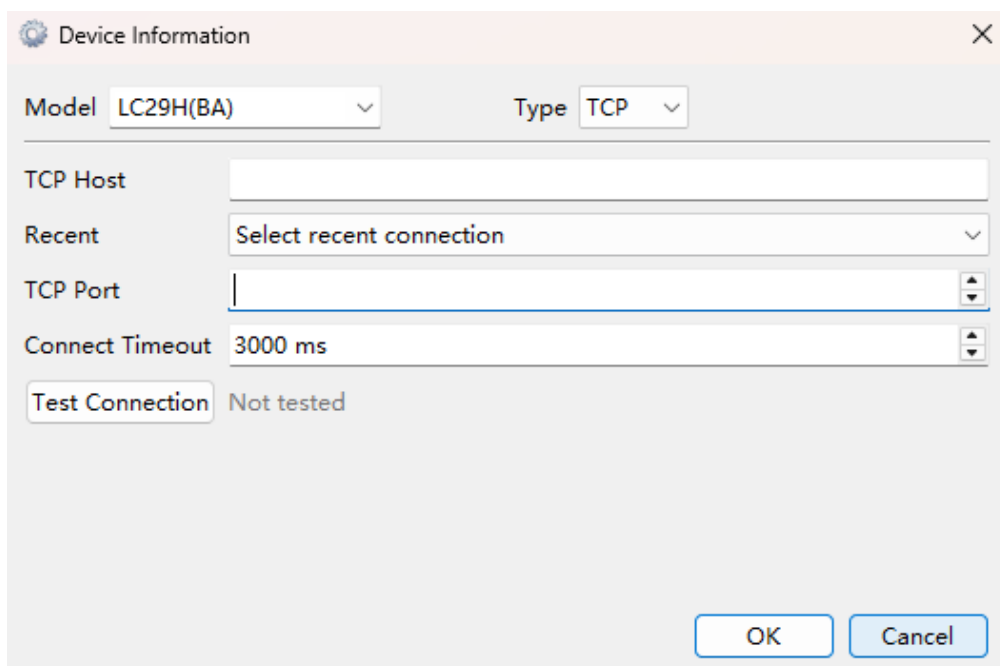


Figure 73: TCP Server Connection Configuration Dialog

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 74: 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.

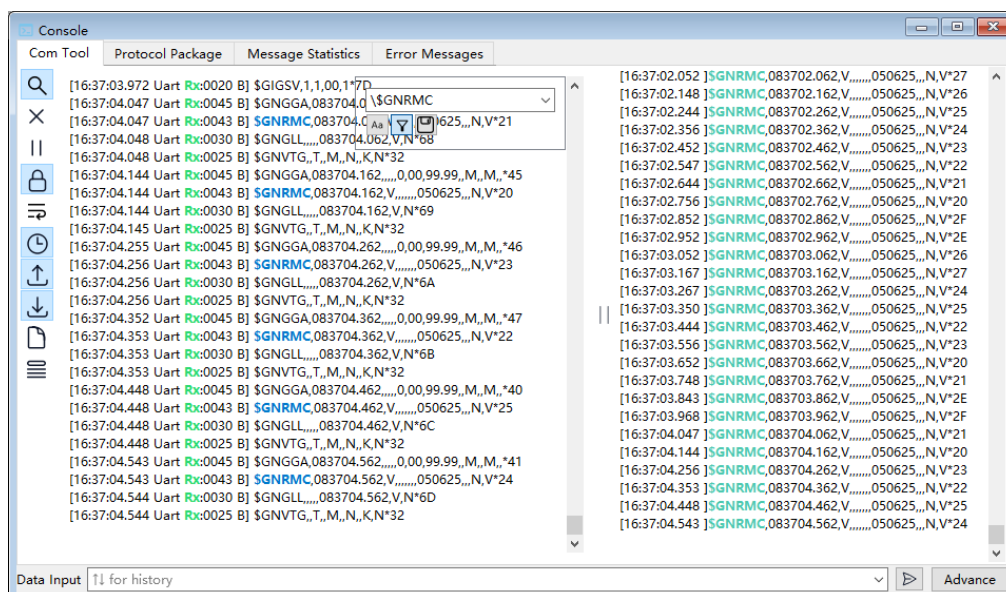


Figure 75: Com Tool Data Matching

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

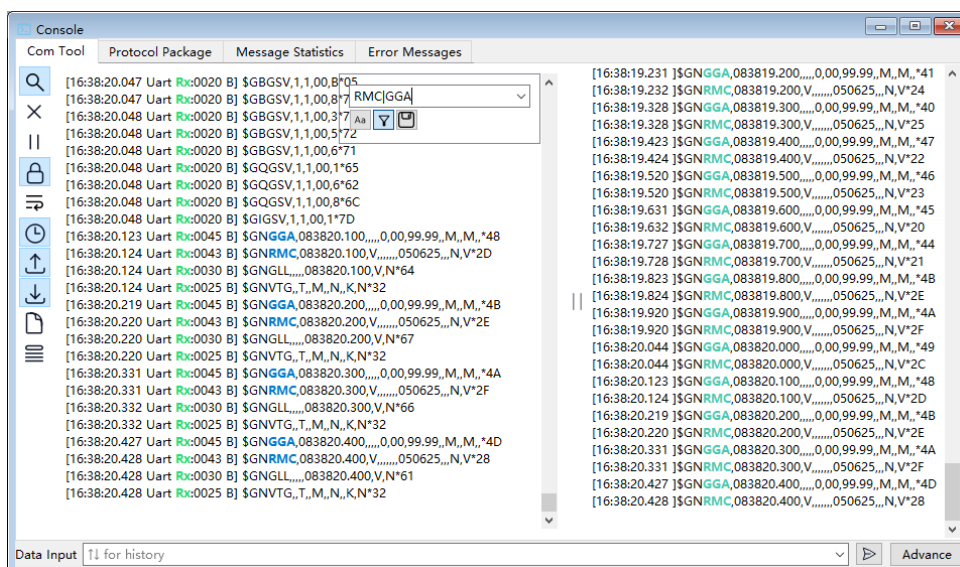


Figure 76: Multiple Messages Matching in Com Tool

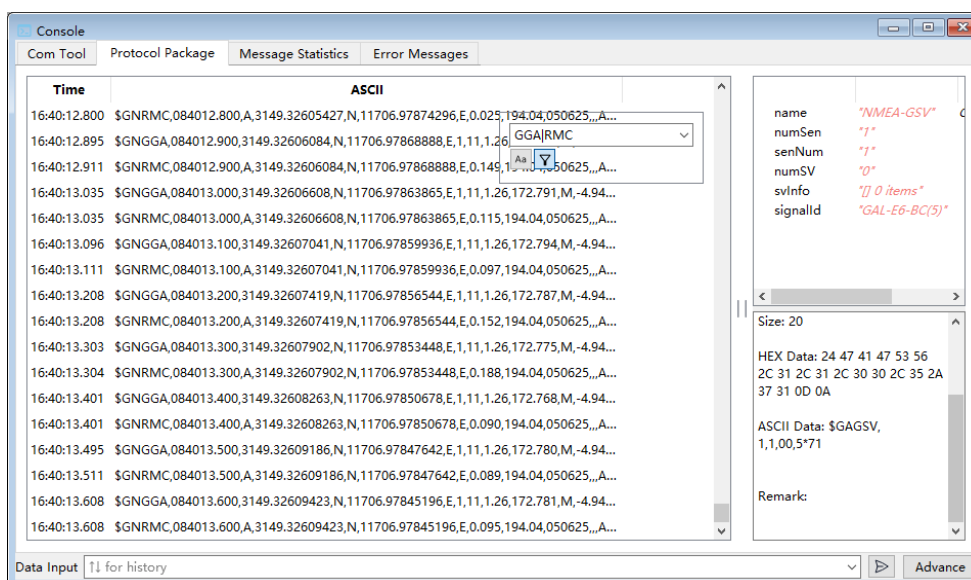


Figure 77: Multiple Messages Matching in Protocol Package

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 Sending

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

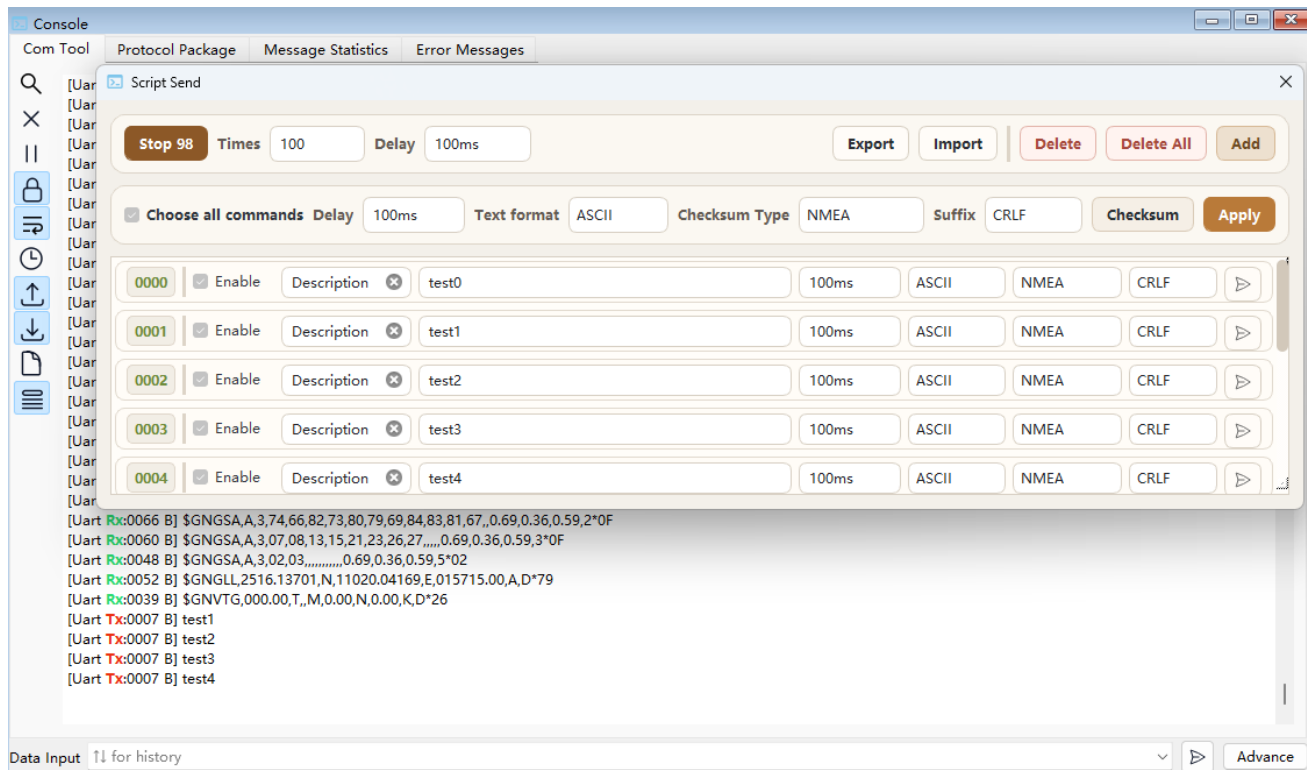


Figure 78: Send Script

Send one command at a time:

1. Enter the command to be sent in the command box.
2. Configure the parameters behind the command box (time delay, data format, checksum type and suffix, see [Chapter 2.2.5.7 Console Sub-Window](#) for details.).
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. Configure the parameters behind each command box separately or tick the “**Choose all commands**” checkbox to configure parameters for all commands in one batch. After the configuration is completed, click  and the configuration will take effect for all commands.
3. Enter the number of cycles in “**Times**” input box and the delay time (unit: ms) of each cycle in the after “**Delay**” input box.
4. Click  button, as shown in [Figure 42: 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.

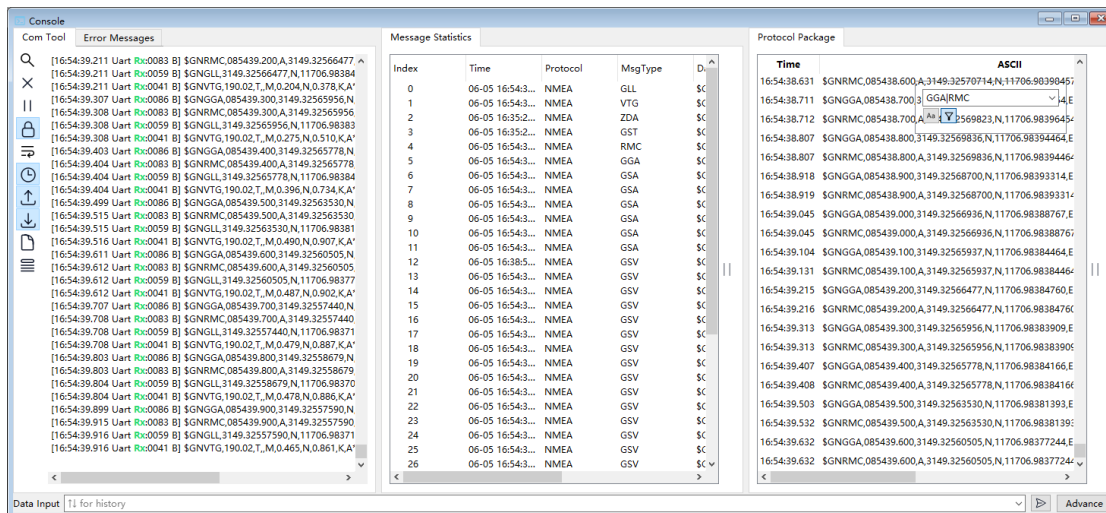


Figure 79: Console Window Display

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.

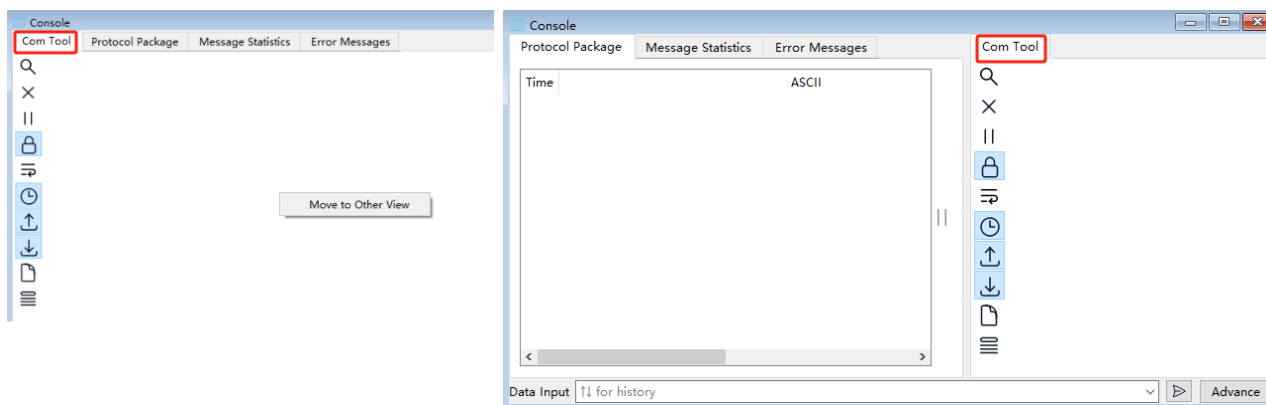


Figure 80: Console Window Splitting

3.3. Log Play

Steps to replay a recorded log file:

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

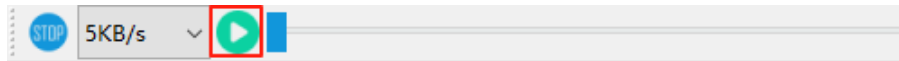


Figure 81: Log Play

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.

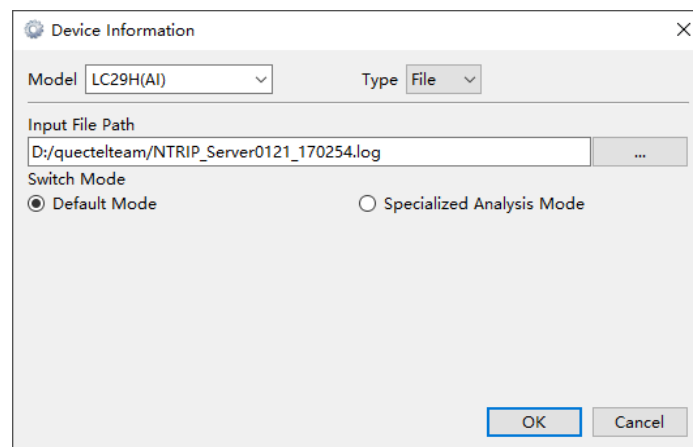


Figure 82: Select File – Default Mode

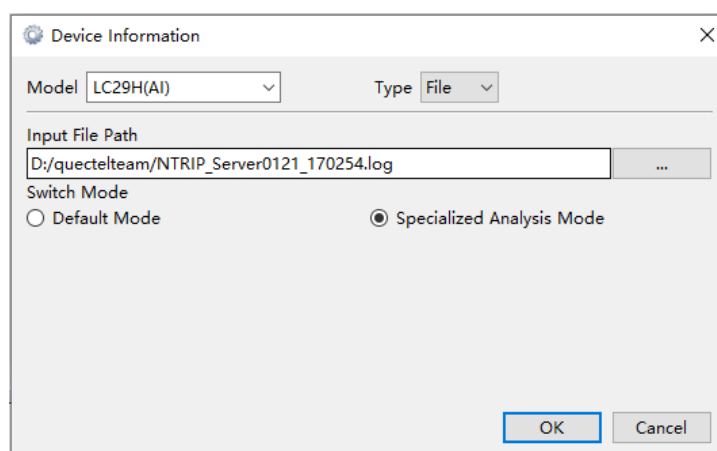


Figure 83: Select File – Specialized Analysis Mode

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

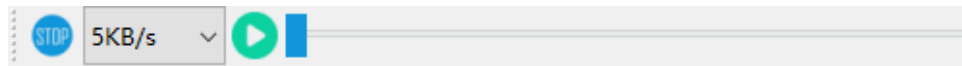


Figure 84: Play Controller

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 85: Restart Receiver

3.5. Configure Receiver

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

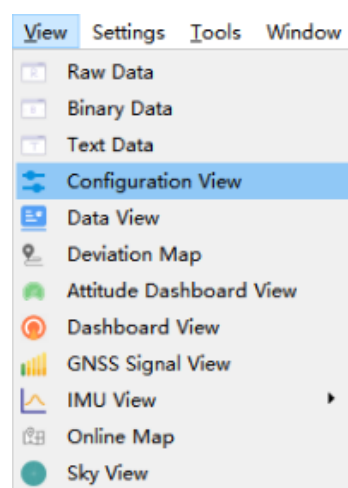


Figure 86: Open Configuration View

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.

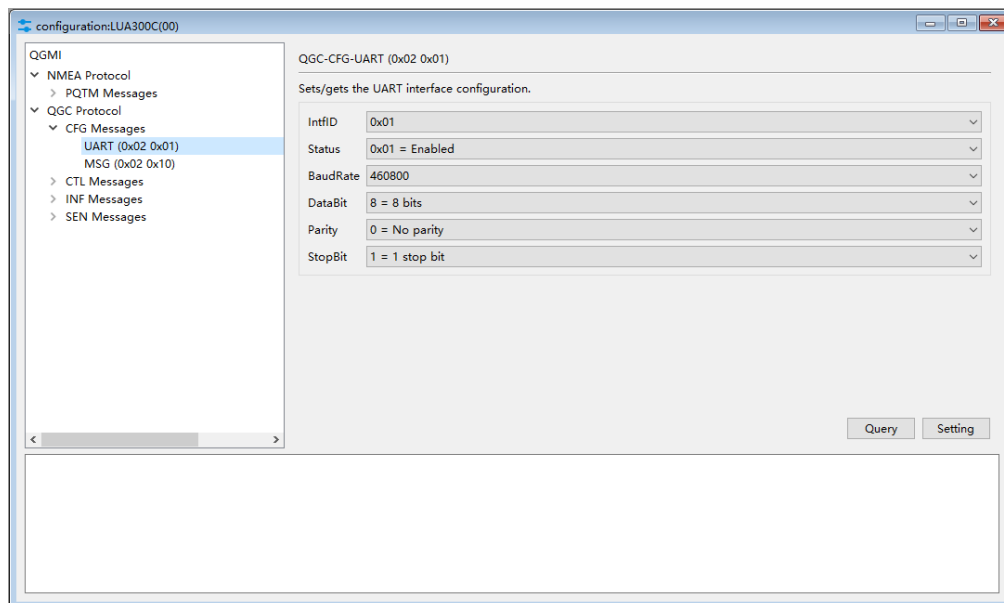


Figure 87: Configuration View

3.6. Download AGNSS Data from Server and Perform TTFF Test

This chapter introduces how to use the QGNSS tool to download AGNSS data from an FTP server and inject the data into the module, and perform a TTFF test.

NOTE

The steps for downloading AGNSS data from the server may vary from module to module. See the AGNSS application note of specific module for details.

3.6.1. 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.

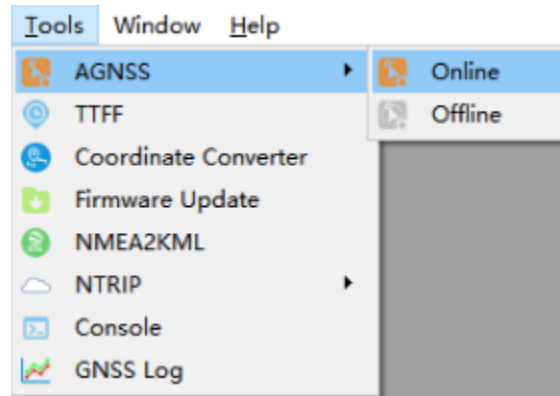


Figure 88: Open AGNSS Sub-Window

3.6.1.1. Online AGNSS

Click "**Online**" in the "**AGNSS**" drop-down menu of the "**Tools**" tab to open the "**Online AGNSS**" window. See [Figure 88: Open AGNSS Sub-Window](#) for details.

Step 1: Select the "**Position**" checkbox to set the position via one of the methods below (You can choose whether to set location information based on actual conditions.):

- Manually input Latitude, Longitude, Altitude and Accuracy
- Select the "**Use Current Position**" checkbox to use the current output position of the module

Step 2: Select the "**UTC**" checkbox to set the UTC time (You can choose whether to set UTC time based on actual conditions.):

- Select the "**Use System Time**" checkbox to use the system time.
- Enter the leap second time in the "**Leap Second**" field.
- Enter the time accuracy in the "**Time Accuracy**" field.

Step 3: Download and inject AGNSS data, taking the EPO files as an example:

1. Select one of the following methods to download the EPO files:
 - Automatic retrieval of EPO files: Uncheck the "**File Select**" checkbox and select the target GNSS constellation(s) under the "**EPO Data**".
 - Manual retrieval of EPO files: Check the "**File Select**" checkbox and the "**EPO**", and then manually select the required EPO files. After selection, click the "**Download Selected File**" button to initiate the download.
 - Manual retrieval of user-provided EPO files: Check the "**File Select**" checkbox and click the button to select the user-provided EPO files.
2. Select the Cold/Warm/Hot start command if required.
3. Click  to start inject the EPO files.

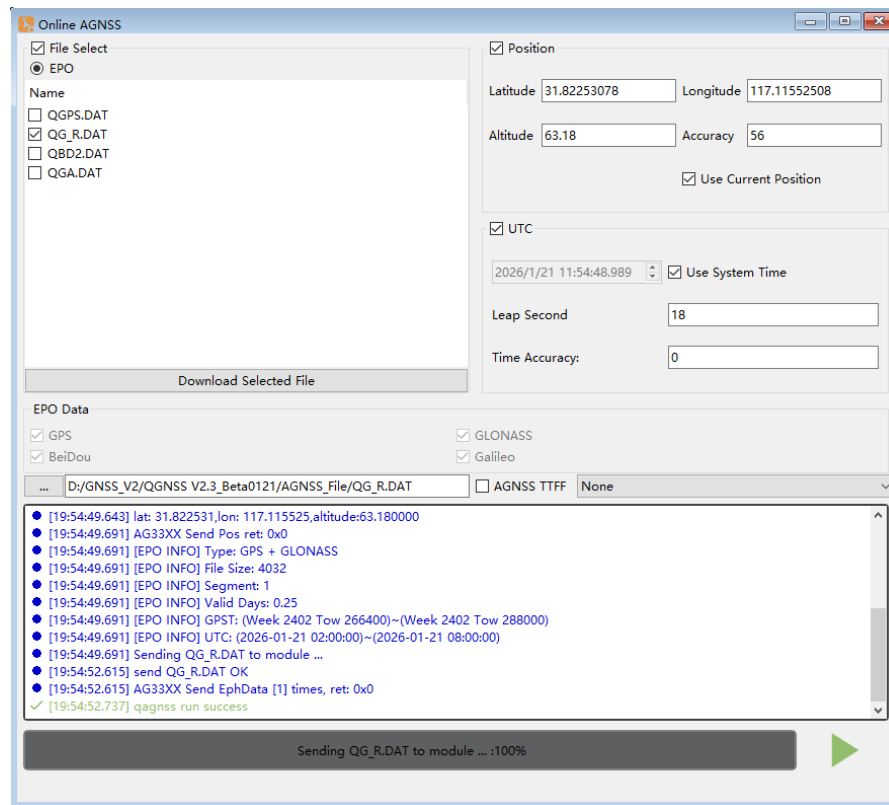


Figure 89: Online AGNSS Sub-Window

3.6.1.2.Offline AGNSS

The steps for downloading the AGNSS data from an FTP server via the “**Offline**” method are essentially the same as those for the “**Online**” method, see [Chapter 3.6.1.1 Online AGNSS](#) for details.

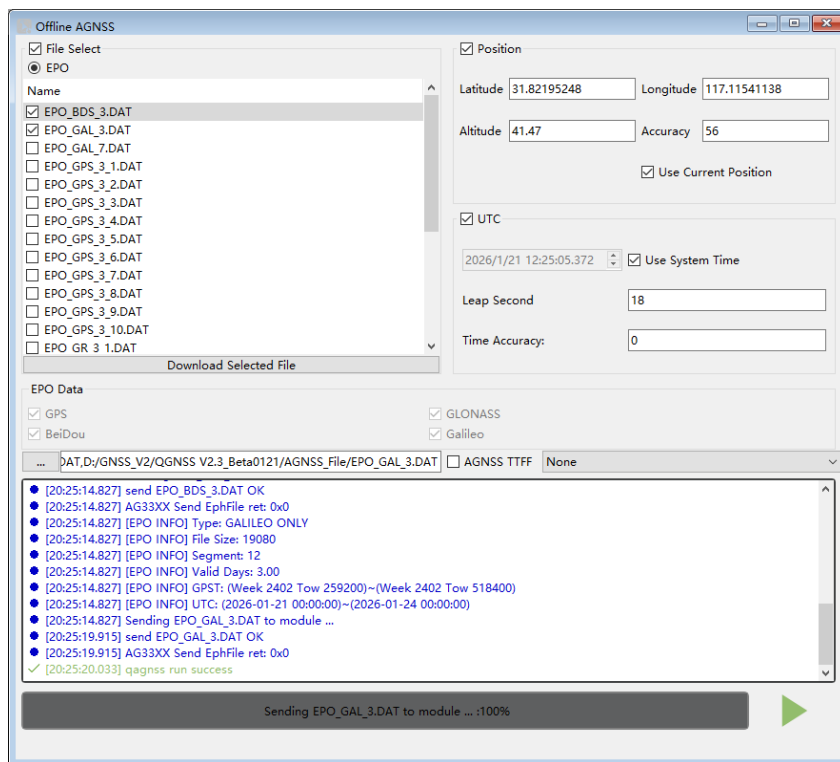


Figure 90: Offline AGNSS Sub-Window

3.6.2. TTFF Test After Injecting AGNSS Data

Check “AGNSS TTFF” checkbox in the “Online AGNSS” or “Offline AGNSS” sub-window, the system will automatically open the “TTFF” sub-window as shown in the figure below. Then, proceed with the TTFF test procedures as outlined in [Chapter 2.2.5.2 TTFF Sub-Window](#) if required.

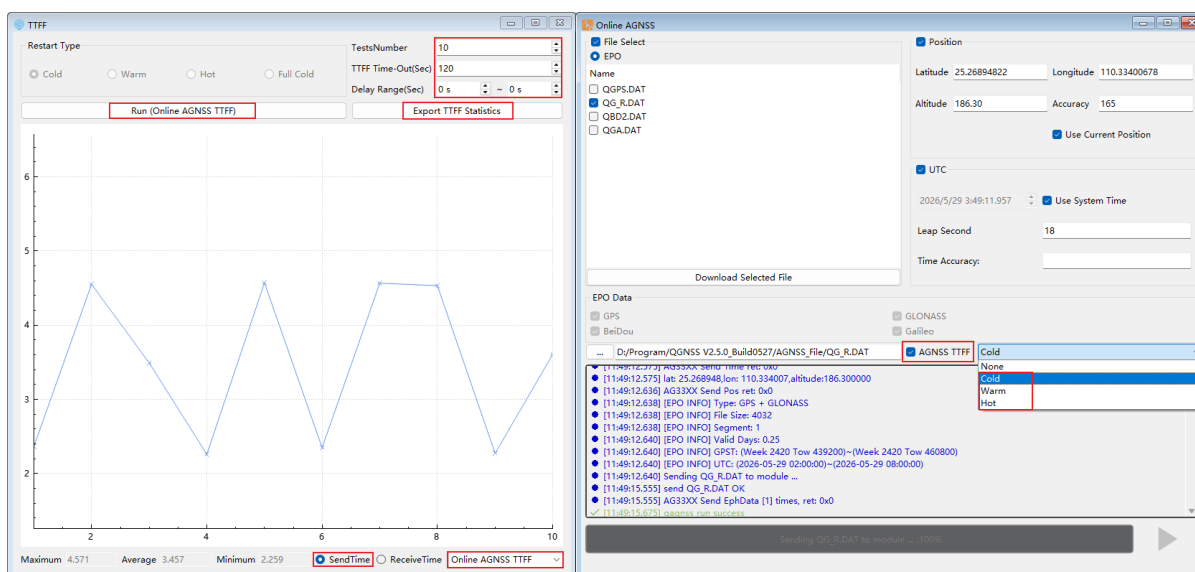


Figure 91: TTFF and AGNSS Sub-Windows

NOTE

If the AGNSS data is downloaded via “**Online AGNSS**” method, the corresponding cold start, warm start or hot start command must be sent through the “**Online AGNSS**” sub-window (as illustrated in the right-side of the figure above). These commands cannot be issued by selecting “**Cold/Warm/Hot/Full Cold**” options under “**Restart Type**” in the “**TTFF**” 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.

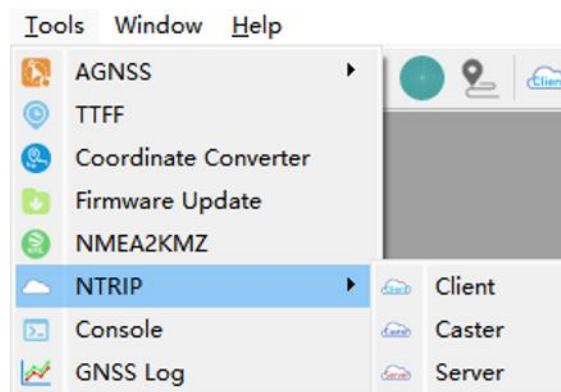


Figure 92: Open NTRIP Caster

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 “**Write Log**” checkbox to enable the log recording feature. The QGNSS will automatically save the received raw RTCM differential data locally. This step is optional and can be performed according to actual application.

Step 4: Check the “**TLS**” checkbox to enable Transport Layer Security encryption for the communication link. This step is optional and can be performed according to actual application.

Step 5: Check the checkbox next to the “**Start/Stop**” and start the “**NTRIP Caster**”.

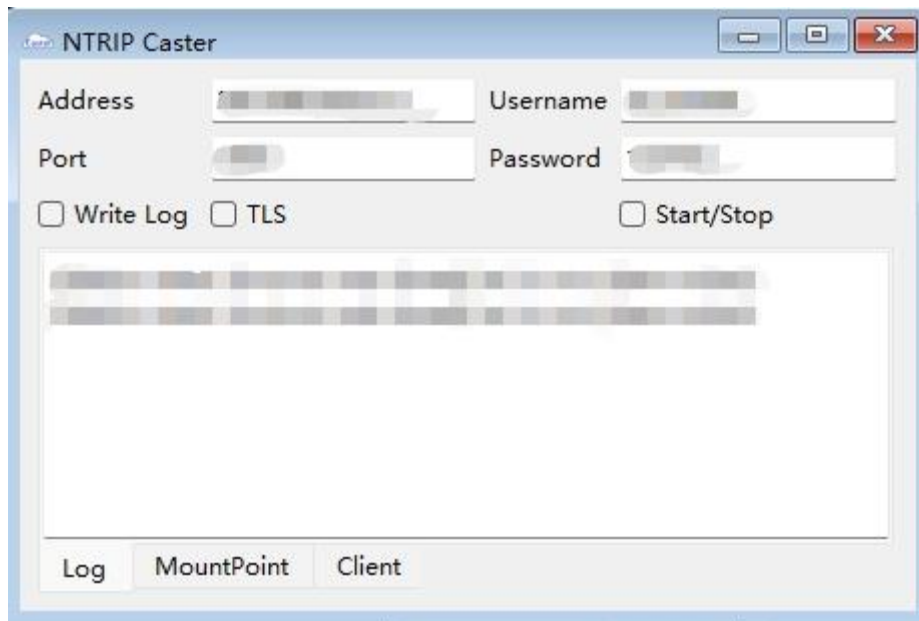


Figure 93: NTRIP Caster

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: gnss@test123

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

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.

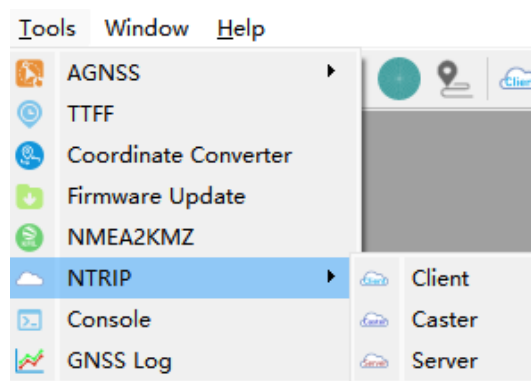


Figure 94: Open NTRIP Server

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 “**TLS**” checkbox to enable Transport Layer Security encryption for the communication link. This step is optional and can be performed according to actual application.

Step 6: Check the checkbox next to the “**Start/Stop**” and start “**NTRIP Server**”. After the “**NTRIP Server**” function is started, the original observation data of LC29H (BS) will be transmitted to “**NTRIP Caster**”.

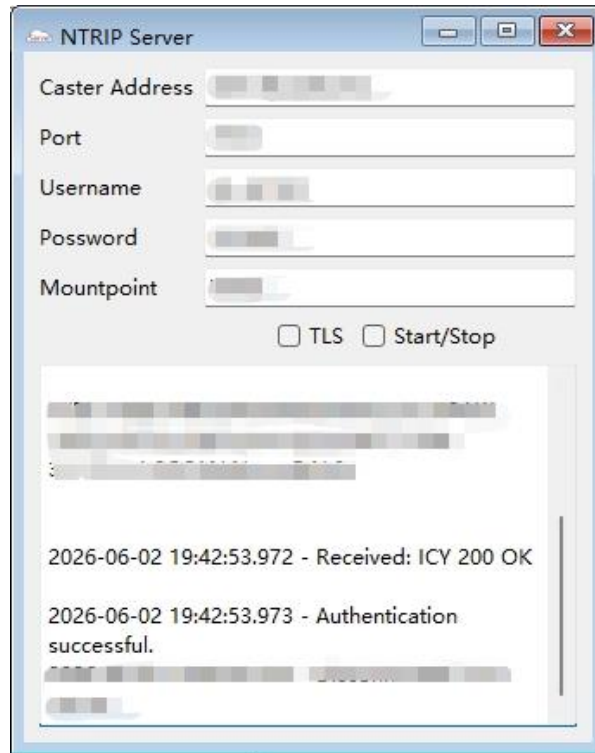


Figure 95: NTRIP Server

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.

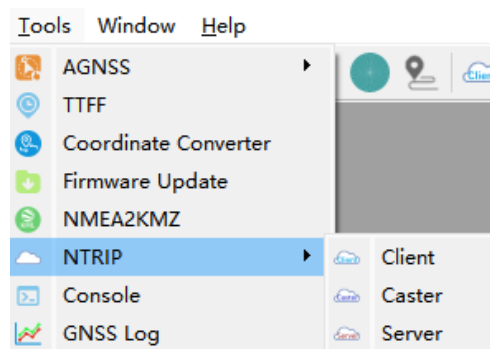


Figure 96: Open NTRIP Client

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 98: 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 “**Use manual position**” checkbox and a window as shown in figure below pops up for entering the relevant position data and then tick “**OK**” button. If the “**Use manual position**” checkbox is unticked, the module will use the data of <Quality> parameter of the **GGA** message in Fixed mode.

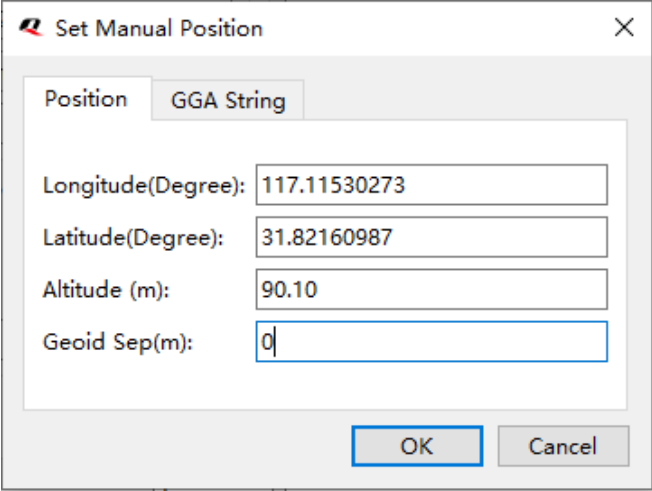


Figure 97: Manually Enter Position

Step 6: Check the “**Write Log**” checkbox to enable the log recording feature. The QGNSS will automatically save the received raw RTCM differential data locally. This step is optional and can be performed according to actual application.

Step 7: Check the “**TLS**” checkbox to enable Transport Layer Security encryption for the communication link. This step is optional and can be performed according to actual application.

Step 8: Turn on the “**Connect to Host**” switch.

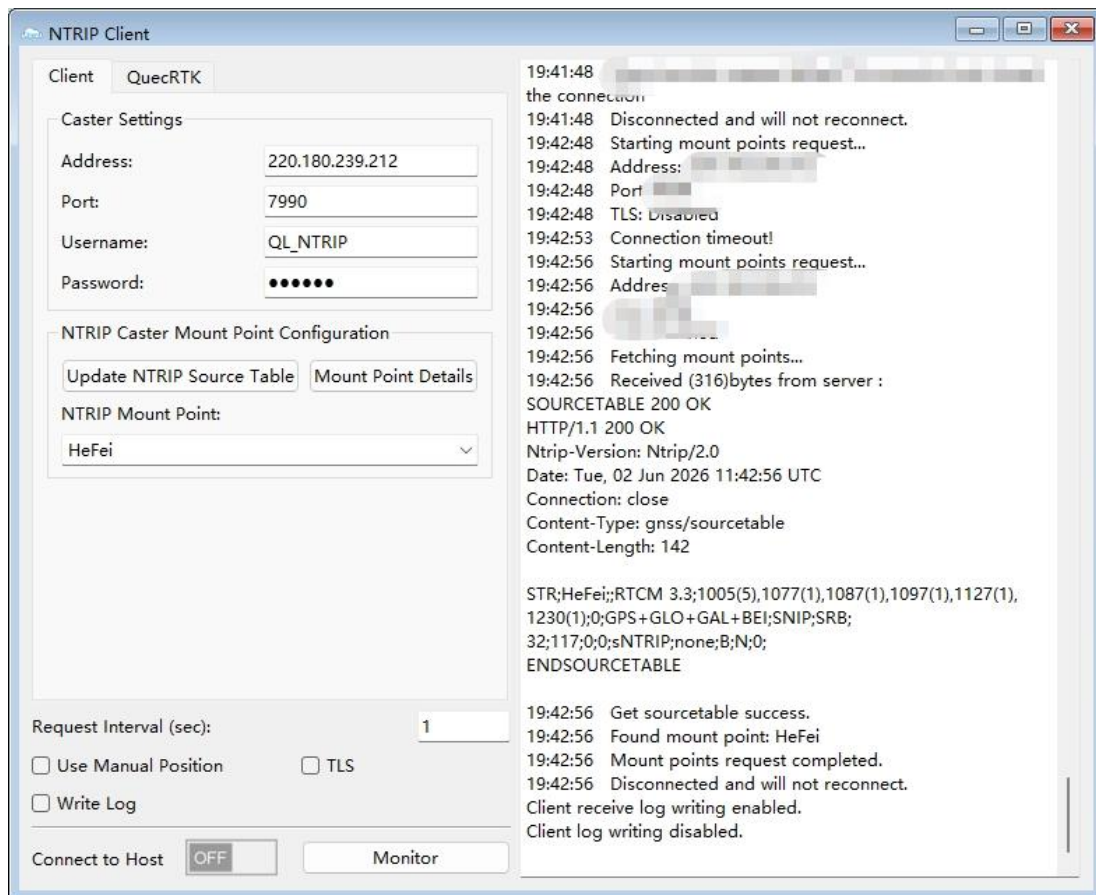


Figure 98: NTRIP Client

Step 9: 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:

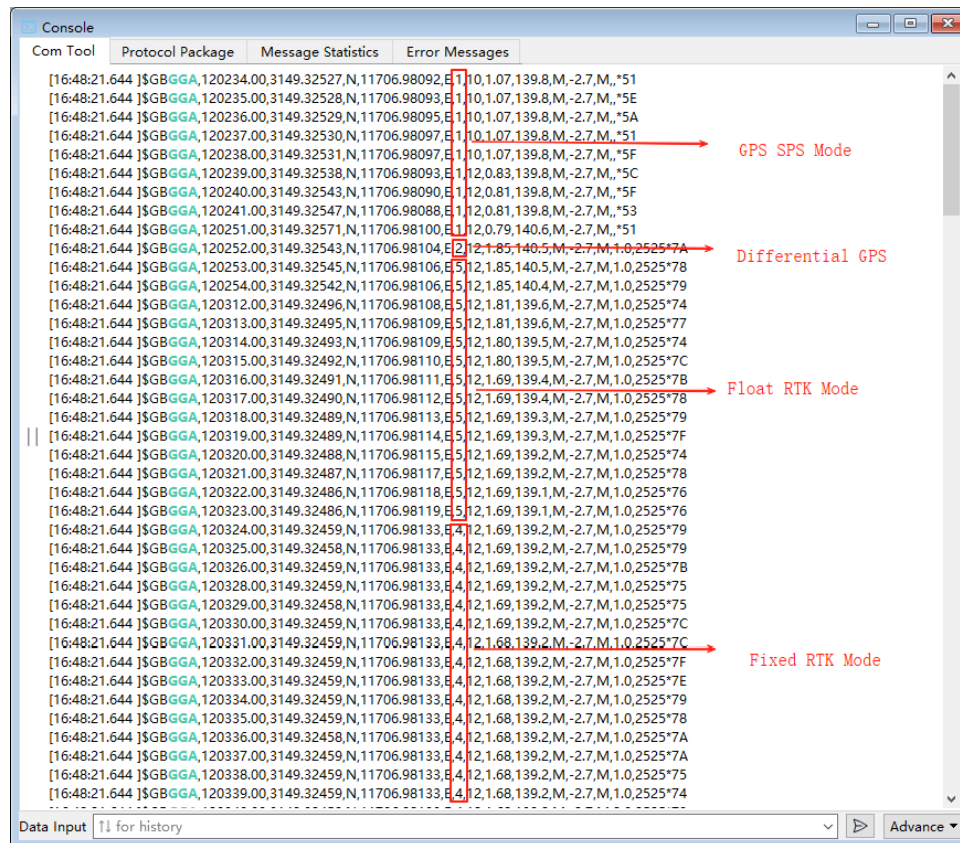


Figure 99: Module Entering Fixed RTK Mode

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 100: RTK Data Monitor

3.8. Firmware Update

Connect to the receiver as explained in [Chapter 3.1.1 Connect to Receiver](#). Click “Firmware Update” in the “Tools” tab drop-down menu to open “Firmware Update” window.

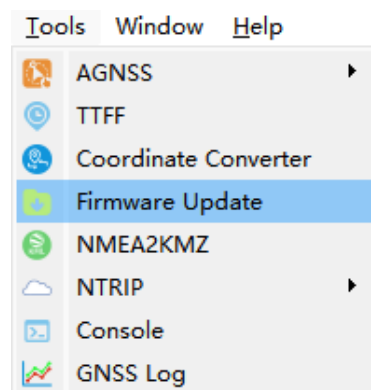


Figure 101: Open Firmware Update

Step 1: Click  to select the receiver firmware.

Step 2: Click  to select the baudrate.

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

Step 4: Reset module.

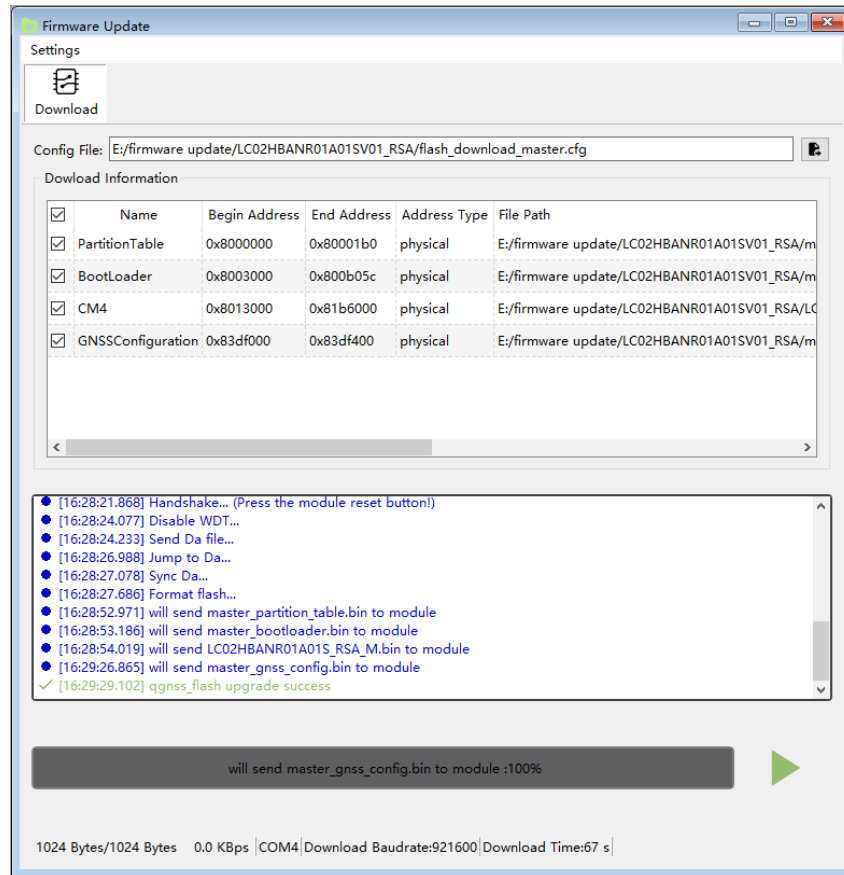


Figure 102: Firmware Update Process

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.

3.9. Voice Alert

The configuration steps for enabling the “voice alert” function are as follows:

Step 1: Click  in the tool bar to open the “Integrated Voice Alerts”.

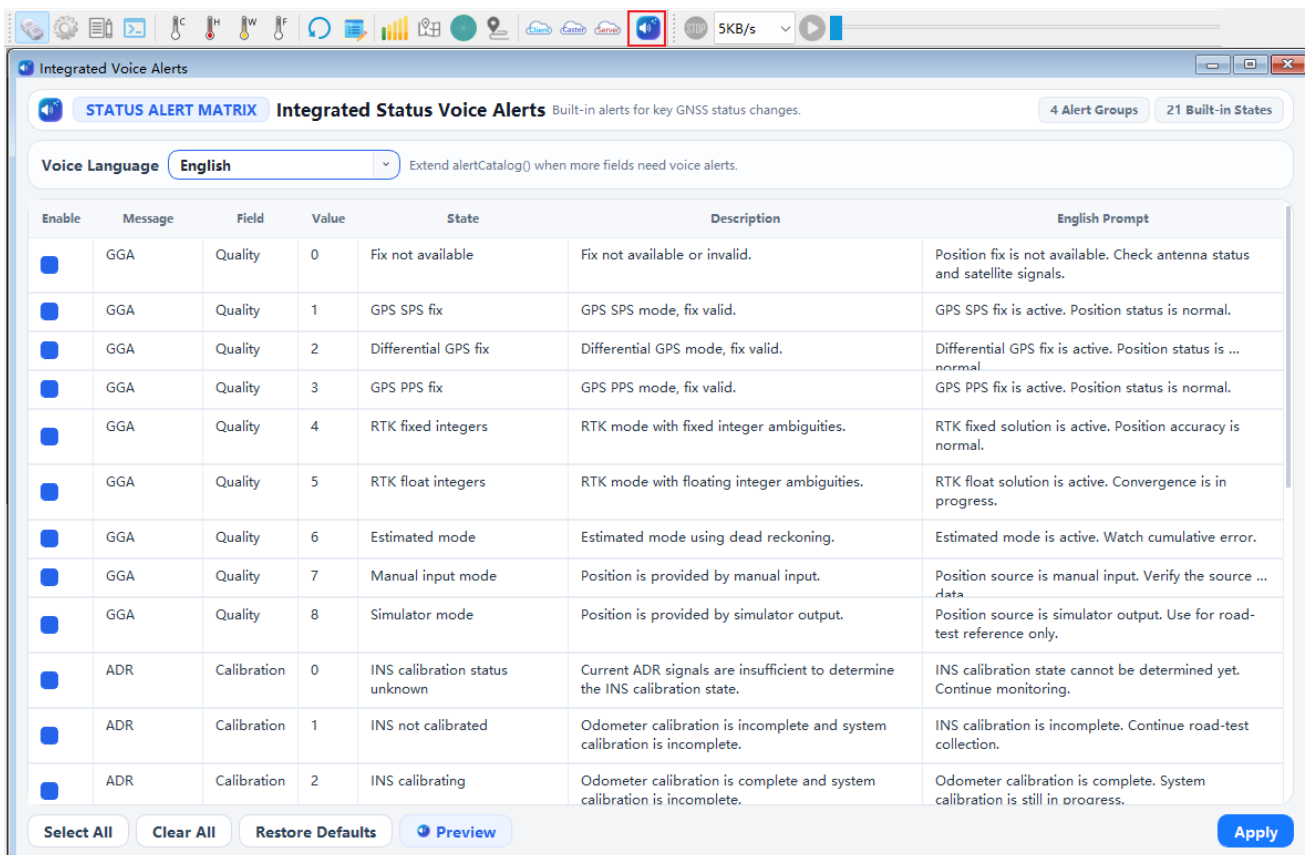


Figure 103: Integrated Voice Alerts Sub-Window

Step 2: Click the drop-down box to the right of “Voice Language” to select the language for voice alerts. Currently, English and Chinese are supported.

Step 3: Click “Select All” to enable voice alerts to all items, and click “Clear All” to cancel voice alerts to all items. You can also individually check the checkbox in front of each voice to enable the voice alert to the specific voice item.

Step 4: Click “Apply” to make the relevant configurations take effect.

4 Appendix References

Table 5: Related Document

Document Name
[1] Quectel_GNSS_RTK_Application_Note

Table 6: Terms and Abbreviations

Abbreviation	Description
ADR	Automotive Dead Reckoning
AGNSS	Assisted GNSS
BDS	BDS Navigation Satellite System
C/N ₀	Carrier-to-Noise Ratio
CEP	Circular Error Probable
DMS	Degrees, Minutes, Seconds
DOP	Dilution of Precision
DR	Dead Reckoning
EPH	Ellipsoid Height
EPO	Extended Prediction Orbit
Galileo	Galileo Satellite Navigation System (EU)
GLB	Graphics Library Transmission Format Binary
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System

Abbreviation	Description
IRNSS	Indian Regional Navigation Satellite System (NavIC)
KMZ	Keyhole Markup Language Zip
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
TLS	Transport Layer Security
TTF	Time to First Fix