

L89 EVB User Guide

GNSS Module Series

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1 Introduction

This document defines and specifies the application of L89 EVB (Evaluation Board) which is a type of assistant tool used by engineers to develop and test Quectel L89 modules.

1.1. Safety Information

The following safety precautions must be observed during all phases of operation, such as usage, service or repair of any cellular terminal or mobile incorporating L89 module. Manufacturers of the cellular terminal should send the following safety information to users and operating personnel, and incorporate these guidelines into all manuals supplied with the product. If not so, Quectel assumes no liability for customers' failure to comply with these precautions.



Ensure the use of the product conforms to the local safety and environment regulations, and is allowed in the country and the environment required.



Keep away from explosive and flammable materials. The use of electronic products in extreme power supply conditions and locations with potentially explosive atmospheres may cause fire and explosion accidents.



The product must be powered by a stable voltage source, and the wiring shall conform to security precautions and fire prevention regulations.



Proper ESD handling procedures must be followed throughout the mounting, handling and operation of any application that incorporates the module to avoid ESD damages.

2 General Overview

2.1. Top View

The top view of L89 EVB is shown below.

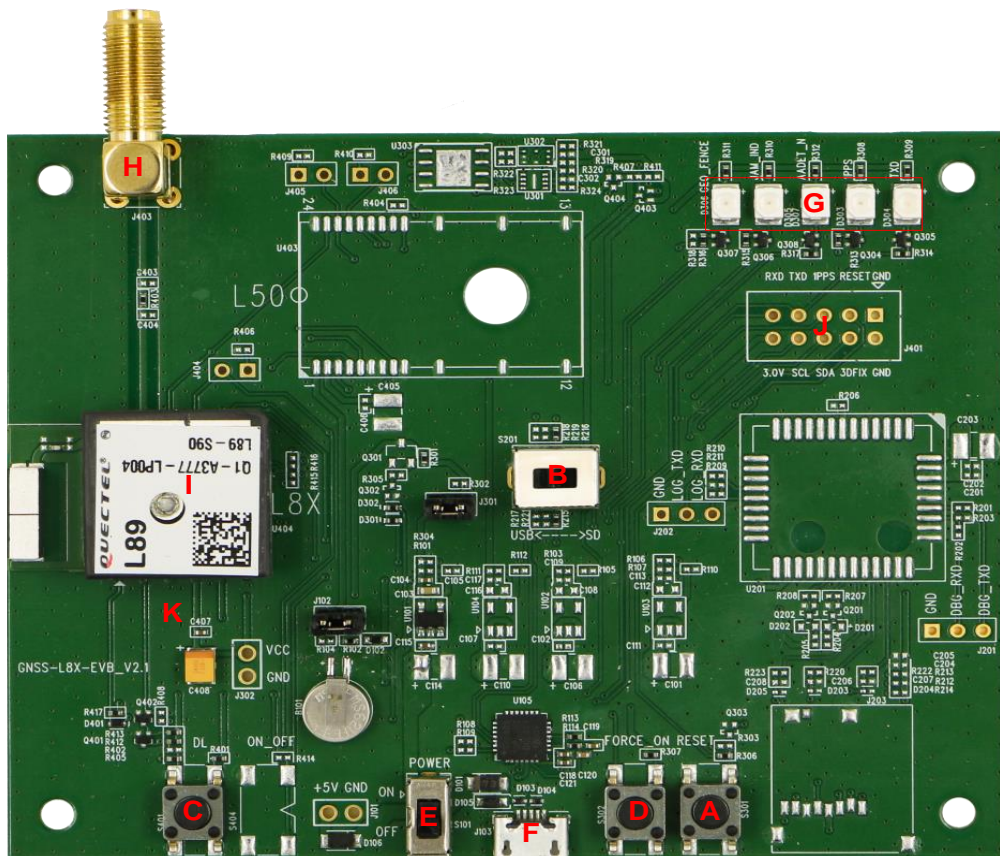


Figure 1: Top View of L89 EVB

Table 1: Interfaces of L89 EVB

SN.	Reference Number	Description
A	S301	RESET button
B	S201	Toggle switch
C	S401	Download button
D	S302	Wake_UP button
E	S101	POWER switch
F	J103	Micro-USB interface
G	D303, D304, D305, D306, D307	Indication LEDs
H	J101	Antenna interface
I	U101	L89 module
J	J106	Test points

2.2. Key Features

The following table shows the detailed features of L89 EVB.

Table 2: Key Features of L89 EVB

Features	Implementation
Power Supply	DC power supply (J103): 4.5V to 5.5V, typically 5.0V
Micro-USB Interface	Power supply and NEMA sentence output
Signal Indication	5 LEDs are available for signal indication
Switches and Buttons	POWER Switch (S101) RESET (S301)
Physical Characteristics	Size: 100mm × 80mm

2.3. EVB Kit Accessories

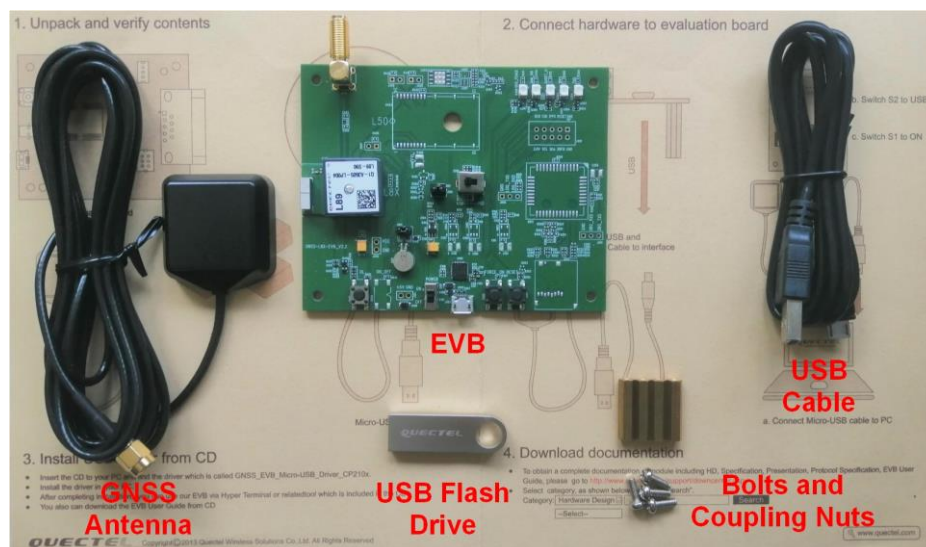


Figure 2: EVB Kit Accessories

Table 3: List of Accessories

Items	Description	Quantity
EVB	L89 EVB	1
Cable	USB cable	1
Antenna	Active GNSS antenna	1
USB Flash Drive	USB flash drive (including L89 related documents, tools, drivers, etc.)	1
Instruction Sheet	A sheet of paper providing instructions for EVB connection, details of EVB accessories, etc.	1
Others	Bolts and coupling nuts	4 pairs

2.4. EVB and Accessories Assembly

The following figure shows the assembly of L89 EVB and its accessories.

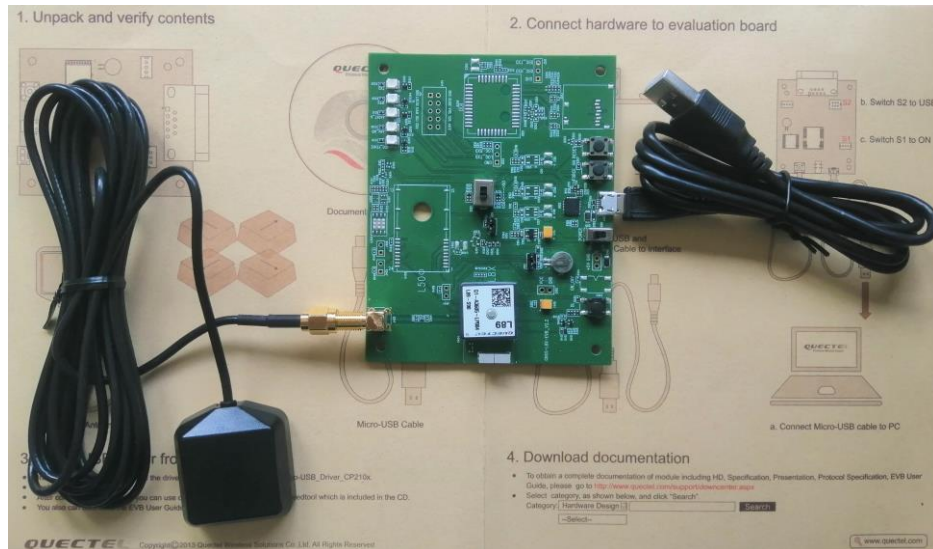


Figure 3: L89 EVB and Accessories Assembly

3 Interface Applications

3.1. Micro-USB Interface

The main power is supplied through the Micro-USB interface. The Micro-USB interface is configured to transfer electrical energy and output NMEA data to the L89 EVB.

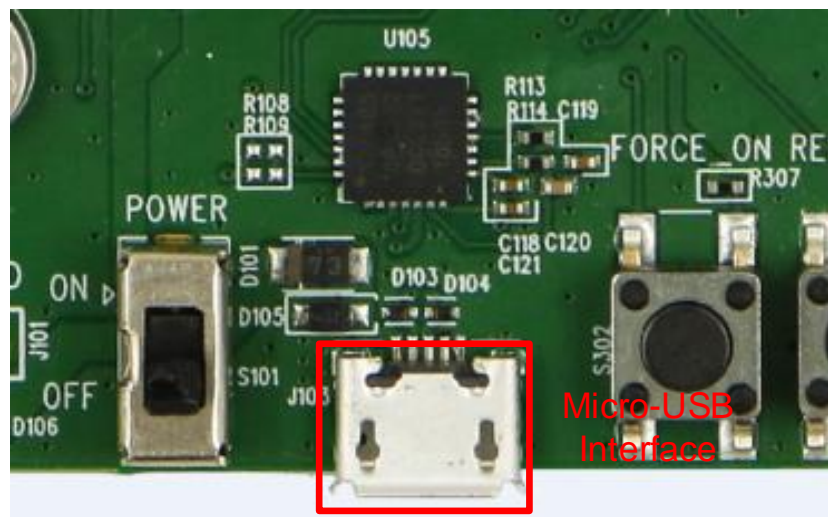


Figure 4: Micro-USB Interface

3.2. Antenna Interface

The L89 module can be connected to a dedicated passive or active GNSS antenna, and the L89 module includes a built-in LNA for improving sensitivity. The antenna interface is configured to connect an external antenna.



Figure 5: L89 EVB Antenna Interface

3.3. Switches and Buttons

The following figure illustrates the switches and buttons of the EVB.

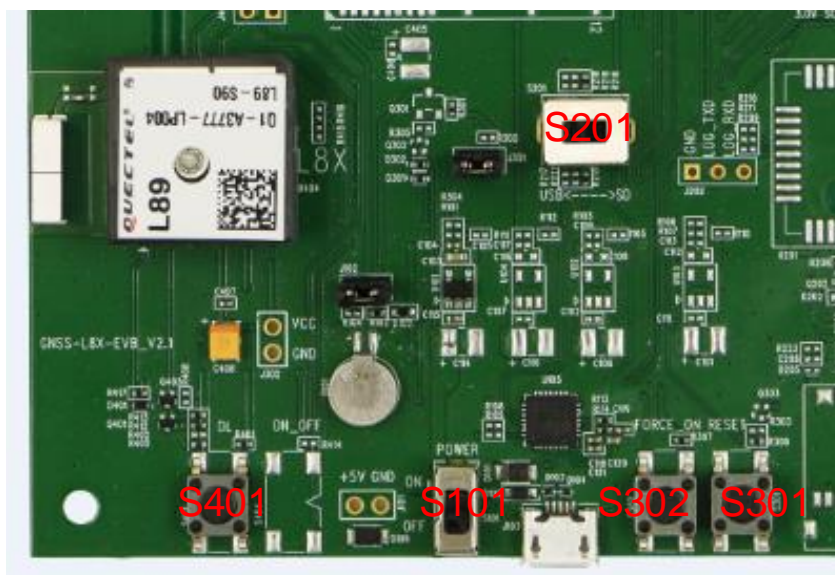


Figure 6: L89 EVB Switches and Buttons

Table 4: L89 EVB Switches and Buttons

Part No.	Name	I/O	Description
S301	RESET	DI	When the button is pressed and then released, the module will be reset.
S302	FORCE_ON	DI	Configured to exit Backup mode of L89 EVB.
S401	DL	DI	Please refer to Chapter 4.2.2 for details.
S101	POWER	PI	Configured to control power supply by using Micro-USB interface.
S201	USB↔SD	IO	Please keep the switch on USB side

3.4. Operation Status Indication LEDs

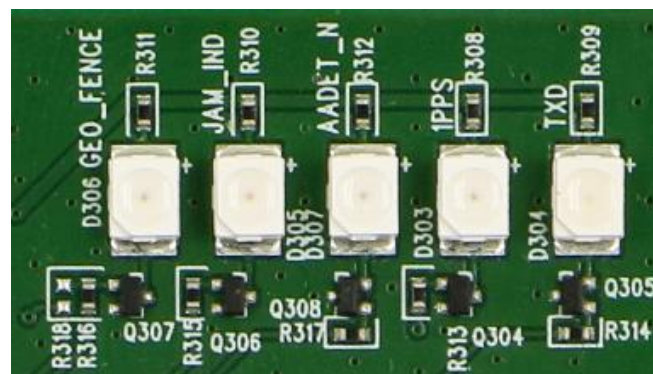


Figure 7: Operation Status Indication LEDs

Table 5: Operation Status Indication LEDs

Part No.	Name	I/O	Description
D304	TXD	DO	Flash: The module is started successfully, and either Micro-USB or SD card interface can be used to output messages. Extinct: The module fails to be started.
D303	1PPS	DO	Flash: Successful position fix. The frequency is 1Hz. Extinct: No position fix.
D307	AADET_N	DO	High: The module has no external active antenna. Low: The module works by using an internal antenna.

D305	JAM_IND	DO	High: No signal is interfered when the module works. Low: Signal is interfered when the module works.
D306	Reserved	DO	Reserved

3.5. Test Points

The following figure illustrates the test points of the EVB.

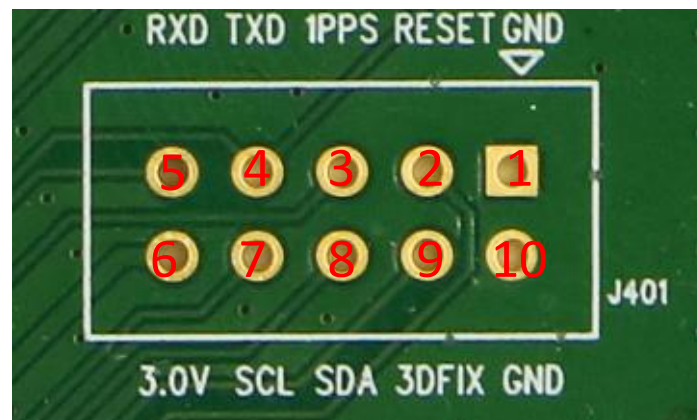


Figure 8: L89 EVB Test Points

Table 6: Pin Description of J106

Pin No.	Signal	I/O	Description
1	GND	-	Ground
2	RESET	DI	System reset
3	1PPS	DO	1 pulse per second
4	TXD	DO	Transmit data
5	RXD	DI	Receive data
6	3.0V	PI	I2C pull up power input
7	SCL	DI	I2C serial clock
8	SDA	IO	I2C serial data
9	3D_FIX	IO	3D-FIX instructions signal

4 EVB Operation Procedures

L89 module is upgraded through the UART port (UART_TX/UART_RX) in two methods: firmware downloading in normal working mode and firmware downloading in boot download mode.

4.1. Communication through Micro-USB Interface

Step 1: Connect the EVB to the PC by using a Micro-USB cable through Micro-USB interface, and then switch POWER pin to ON state to power on the EVB.

Step 2: Run the USB flash drive on the PC to install the USB driver, where the USB port numbers can be viewed through the PC Device Manager, as shown below.

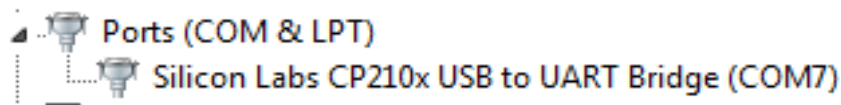


Figure 9: USB Ports

Step 3: Install and then use the QCOM tool provided by Quectel to implement the communication between L89 module and the PC.

The following figure shows the COM Port Setting interface of the QCOM tool. The customers can select the correct “**COM Port**” (USB Port shown in the foregoing figure) and set the correct “**Baudrate**” (the default value: 9600bps). For more details of usage of the QCOM tool, please refer to *Quectel_QCOM_User_Guide*.

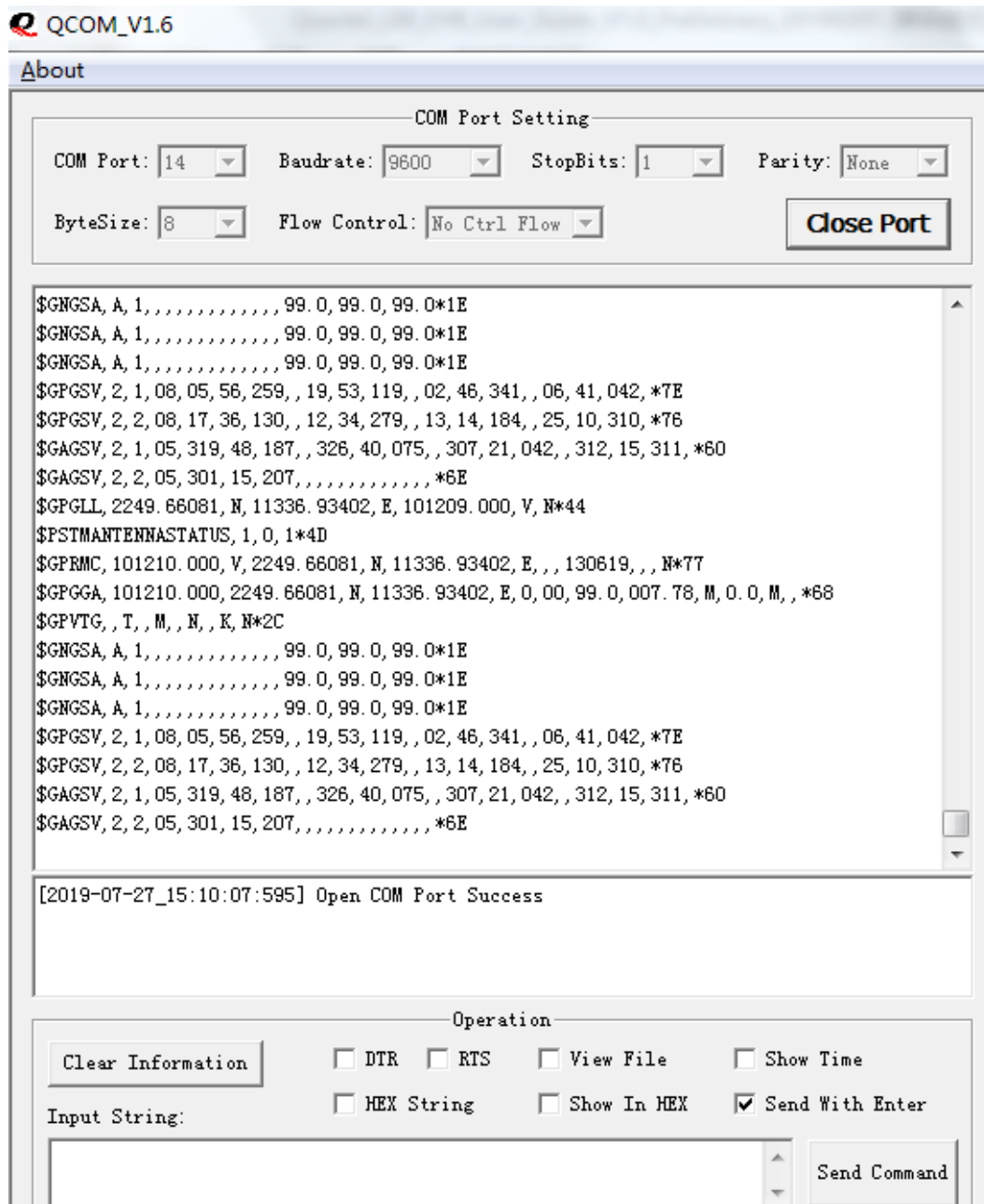


Figure 10: COM Port Setting Interface of QCOM

4.2. Firmware Downloading

L89 module supports the firmware downloading in both normal working mode and boot download mode by using the tools of STA808x/9x Firmware Upgrade and TeseoIII XLoader respectively.

4.2.1. Firmware Downloading in Normal Working Mode

Steps of firmware downloading in normal working mode are as follows:

Step 1: Connect the EVB to a PC by using the USB cable.

Step 2: Switch the POWER pin to ON state to power on the EVB.

Step 3: Run the STA808x/9x Firmware Upgrade Tool and configure the tool as shown below.

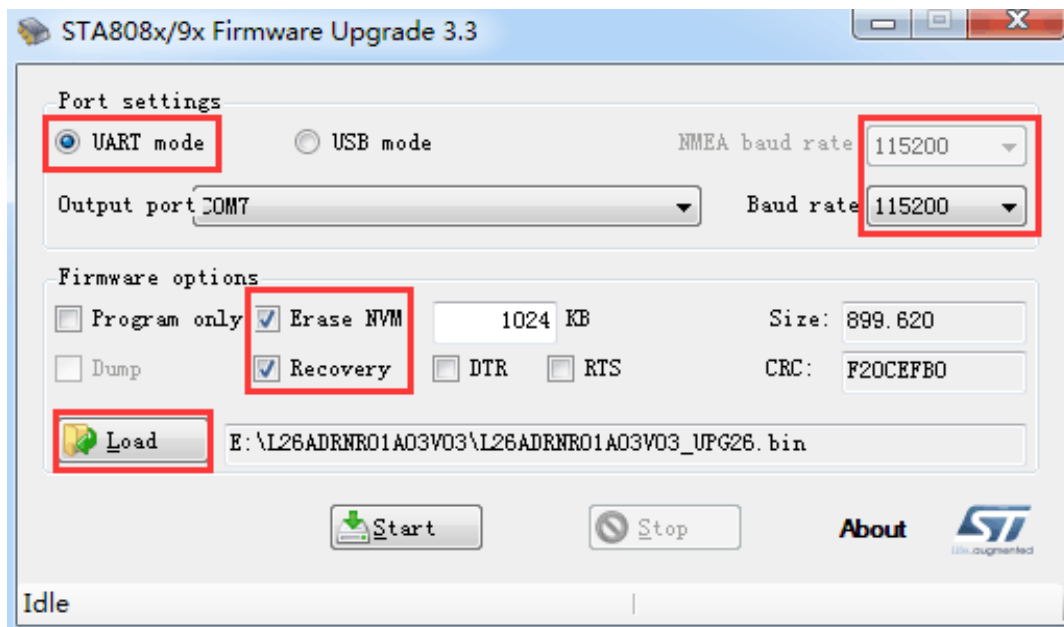


Figure 11: STA808x/9x Firmware Upgrade Tool Configurations for Firmware Upgrade

Step 4: Click  **Start** button and then reset the module to upgrade the firmware.

4.2.2. Firmware Downloading in Boot Download Mode

Steps of firmware downloading in boot download mode are as follows:

Step 1: Connect the EVB to a PC by using the USB cable.

Step 2: Long press DL button (the 3D-FIX/BOOT pin of L89 will be pulled up to connect the VCC pin by using a 10kΩ resistor), and switch POWER pin to ON state to power on the EVB. Once the high voltage level of 3D-FIX/BOOT pin has been detected during power-up, the module will enter bootloader download mode.

Step 3: Release DL button to enable 3D-FIX/BOOT pin of L89 to return to normal floating.

Step 4: Run the TeseoIII XLoader tool and configure the tool as shown below.

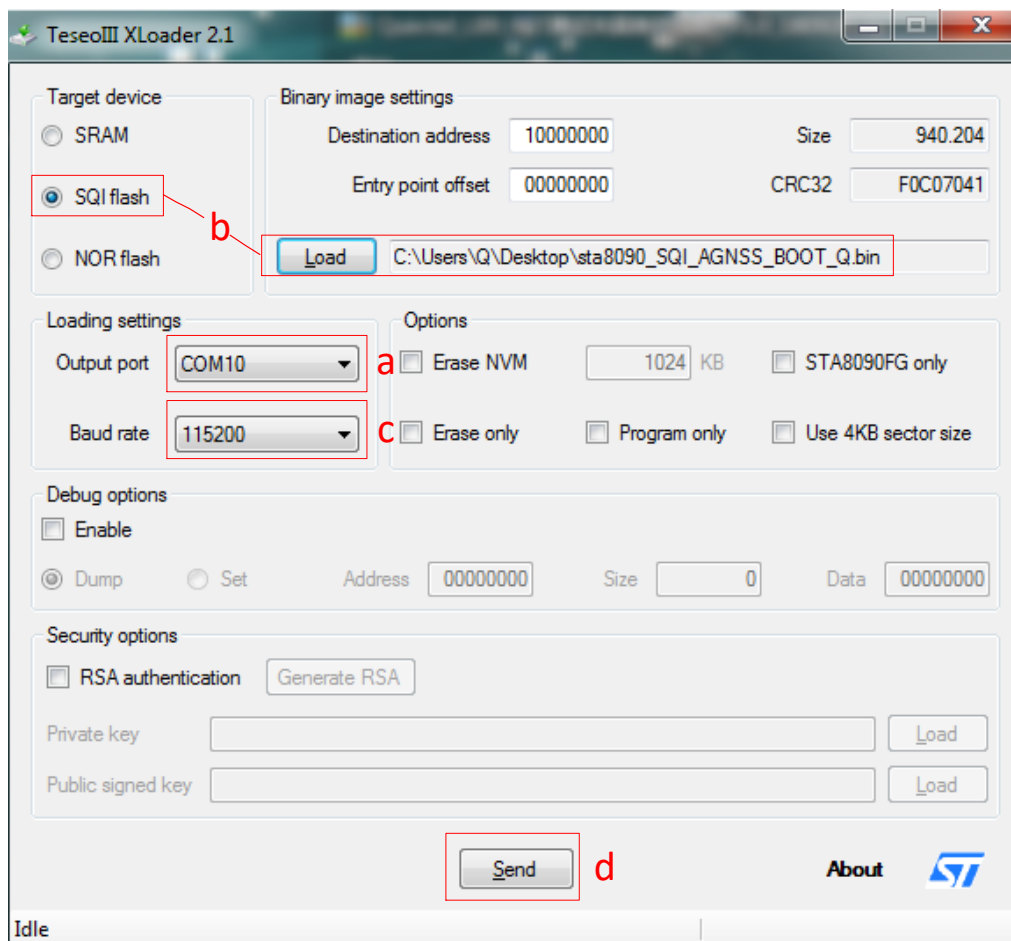
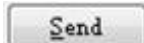


Figure 12: TeseoIII XLoader Tool Configurations for Firmware Upgrade

Step 5: Click  button to upgrade the module.

5 Usage of Teseo-Suite Pro Tool

After EVB accessories are assembled, please start the module and the Teseo-Suite Pro tool. The tool can help users to view the status of GNSS receiver and monitor module calibration result conveniently. For more details about the tool, please click “**Help**” and select “**User Manual**” in the tool interface.

5.1. View GNSS Receiver Status

5.1.1. COM Port and Baud Rate Setting

After the tool is started, the following interface will be displayed.

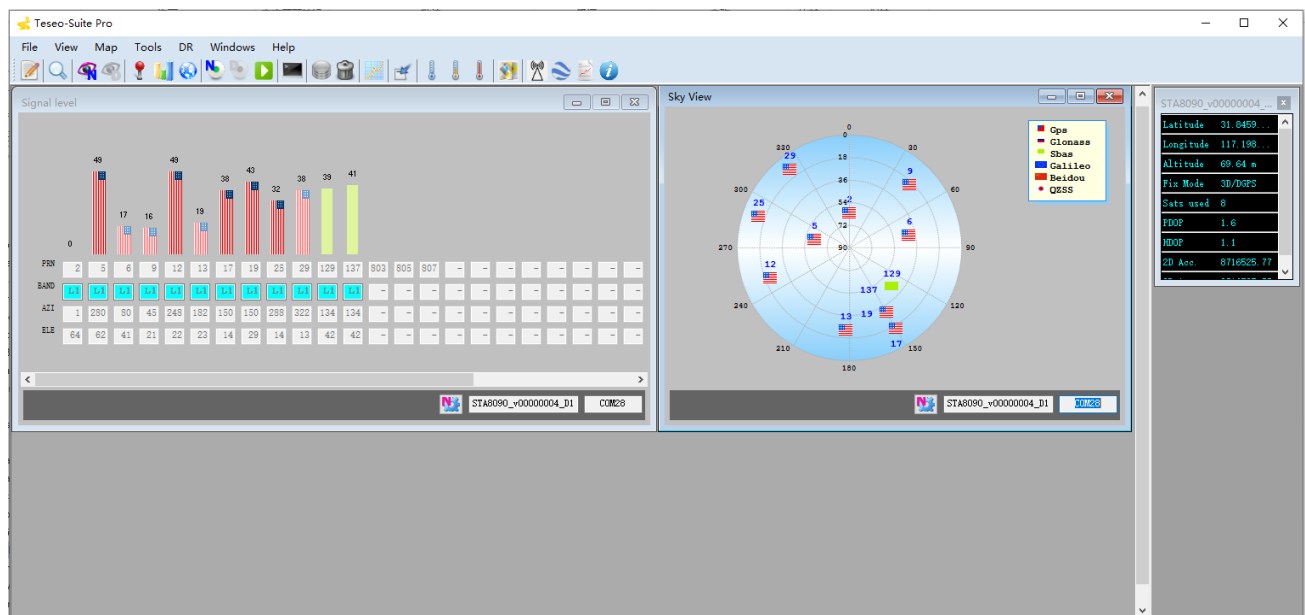


Figure 13: Teseo-Suite Pro Tool Interface

UART port can be automatically identified by Teseo-Suite Pro tool when the tool is started. If manual modification is required, steps a to d illustrated in the following figure need to be performed.

For steps a to c, the customers can click the corresponding buttons. After **+Add Device** button is clicked, the “Configuration Device” box will be displayed. Then, the customers can check the “Add Control Port” box.

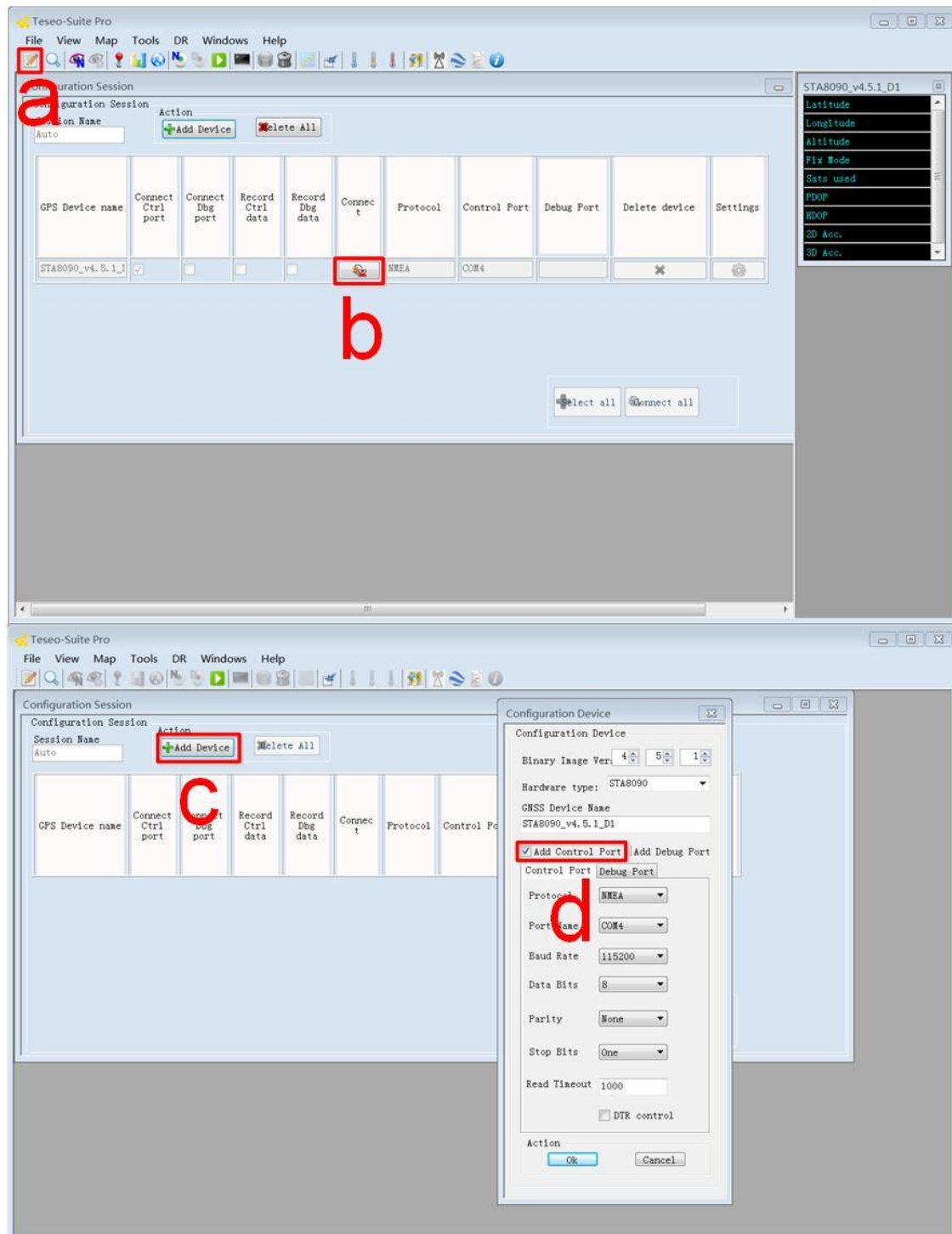



Figure 14: Manual Configuration of the COM Port

5.1.2. Explanations of Views and Windows

The following interface will be displayed after  button is clicked. The digit shown above each column is the CN value. The digits shown below each column are displayed information such as the PRN, the frequency band (**BAND**) used by the satellite, the azimuth (**AZI**) and the elevation (**ELE**) of the satellite. Bright-colored columns indicate that the navigation data of this satellite is in use, while faded columns indicate no usage of the navigation data.

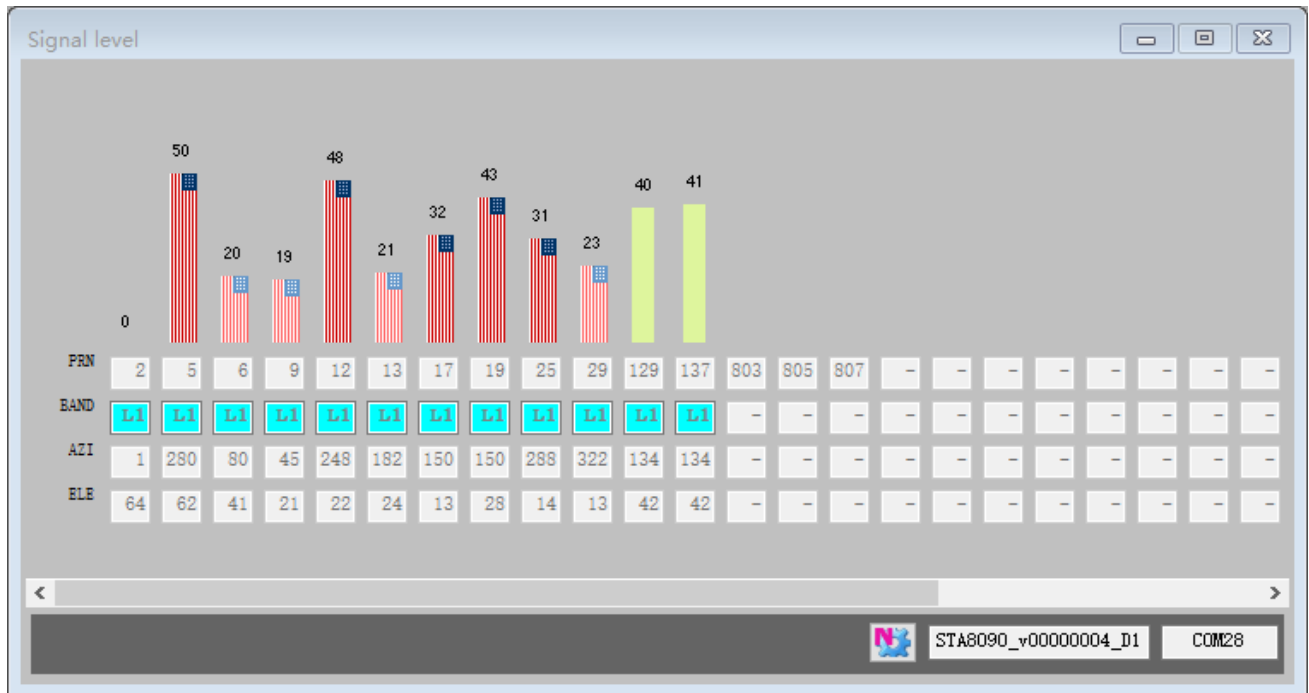


Figure 15: Signal Level

After  button is clicked, the positions of the satellites that are relative to the earth and that are received by L89 will be displayed.

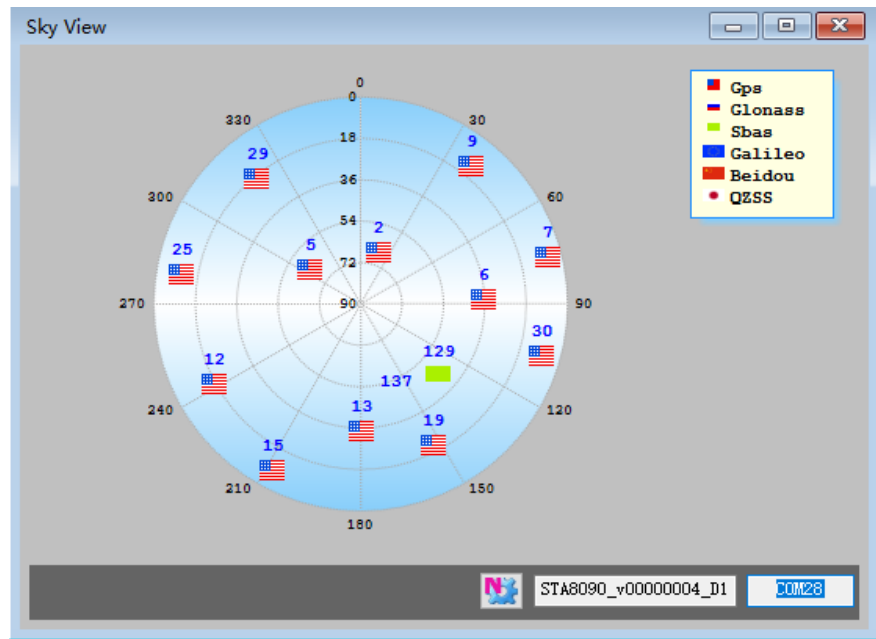



Figure 16: Sky View

By clicking  button, users can view the information such as positions, altitudes, fix modes, satellites in use, speed, UTC Time, and precision.

PVT	
Label	STA8090_v4.5.1_D1
Latitude	31° 50.7749
North/South	N
Longitude	117° 11.1111
East/West	E
Altitude	72.80 m
Geoid	0 m
Fix Mode	3D
TTFF	
Filter Mode	
Nb sats ...	11
GPSQual	DGPS
Speed	0 km/h
Heading	70.61°
UTC Time	13:40:03
Day	
Month	

Reference Position	
Ant Latitude	4055.04798__ N
Ant Longitude	01416.55162__ E
Height Ant	88.4330700090124
Set Reference Position	
Save Reference Position	

Coordinates Format	
<input checked="" type="radio"/> MinDec	
<input type="radio"/> Decimal degrees	

STA8090_v4.5.1_D1	
Latitude	31.8462...
Longitude	117.198...
Altitude	72.80 m
Fix Mode	3D/DGPS
Sats used	11
PDOP	1.63
HDOP	0.72
2D Acc.	8716528.23
3D Acc.	8716528.23

Figure 17: Module Positioning Form

5.2. Sending of PSTM Commands

PSTM Commands can be sent by using Teseo-Suite Pro tool. After  button is clicked, the following command input box is displayed.

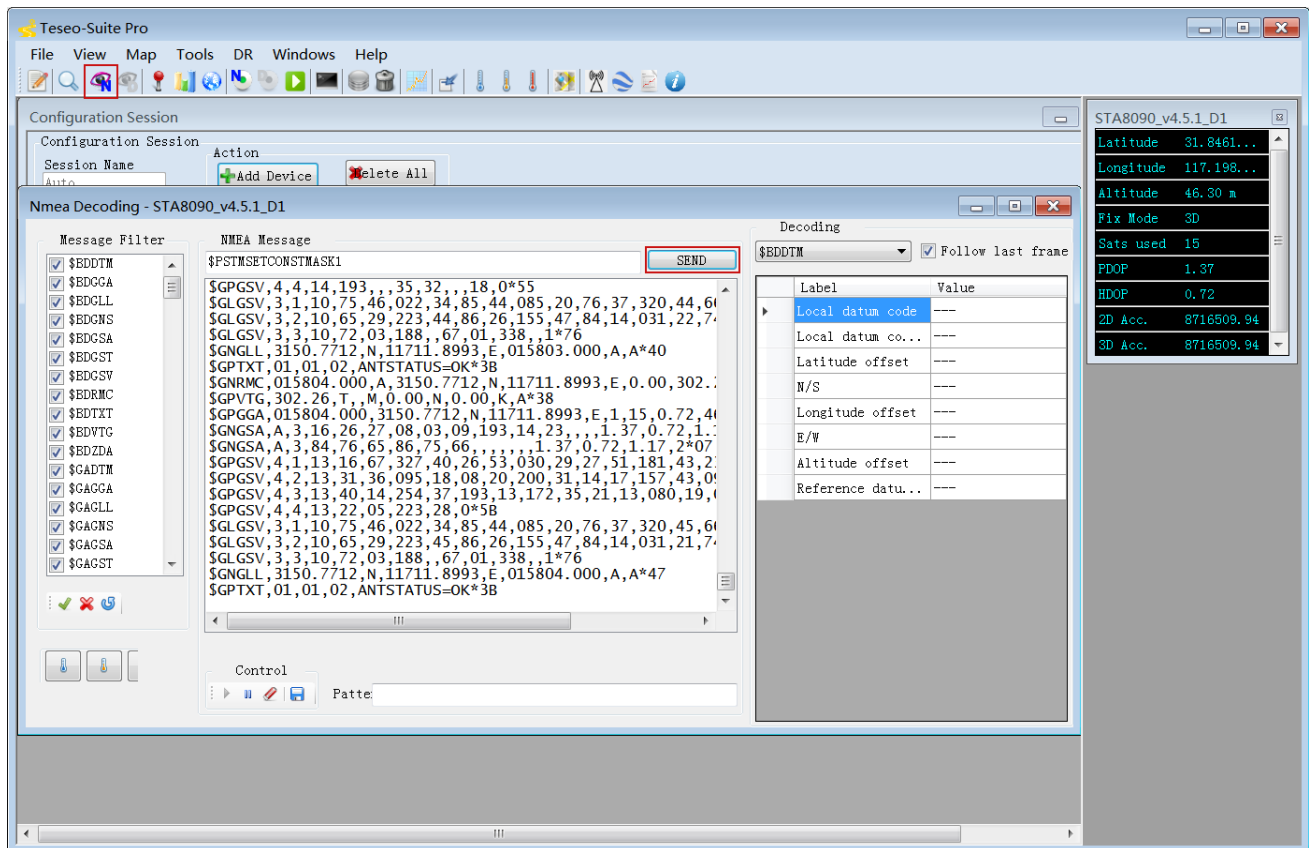


Figure 18: Command Sending Using Teseo-Suite Pro Tool

5.3. Support Setting for IRNSS Satellite Histogram

The configuration indicates that the IRNSS satellite needs to perform the following operations: 1. opening the \$PSTM statement output; 2. configuring the NMEA protocol for the Teseo-Suite Protocol.

5.3.1. Opening of the \$PSTM Statement Output

1. \$PSTMCFGMSGSL,0,1,0x5088535f,0x7ec22018
2. \$PSTMSAVEPAR

5.3.2. Configuration of the NMEA Protocol for the Teseo-Suite Pro Tool

First prepare an NMEA log for playback, which can only be configured based on NMEA protocol specific to Teseo-Suite Pro tool at playback time. Follow the instructions below.

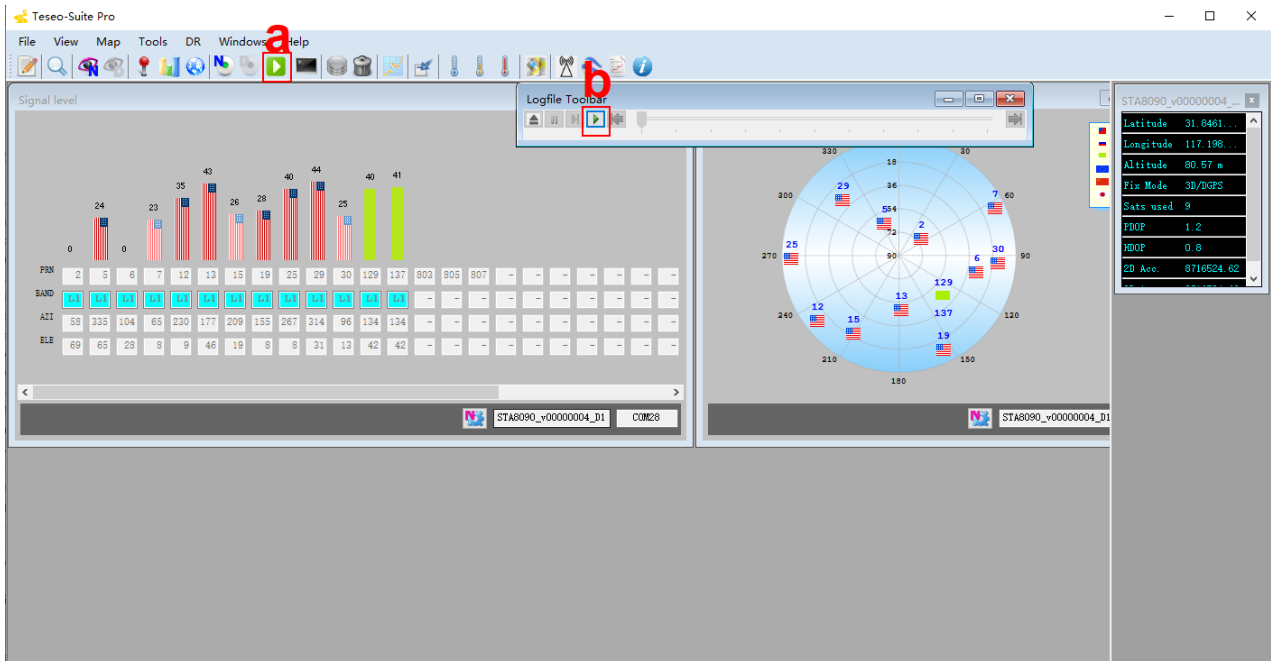


Figure 19: Playback NMEA Log

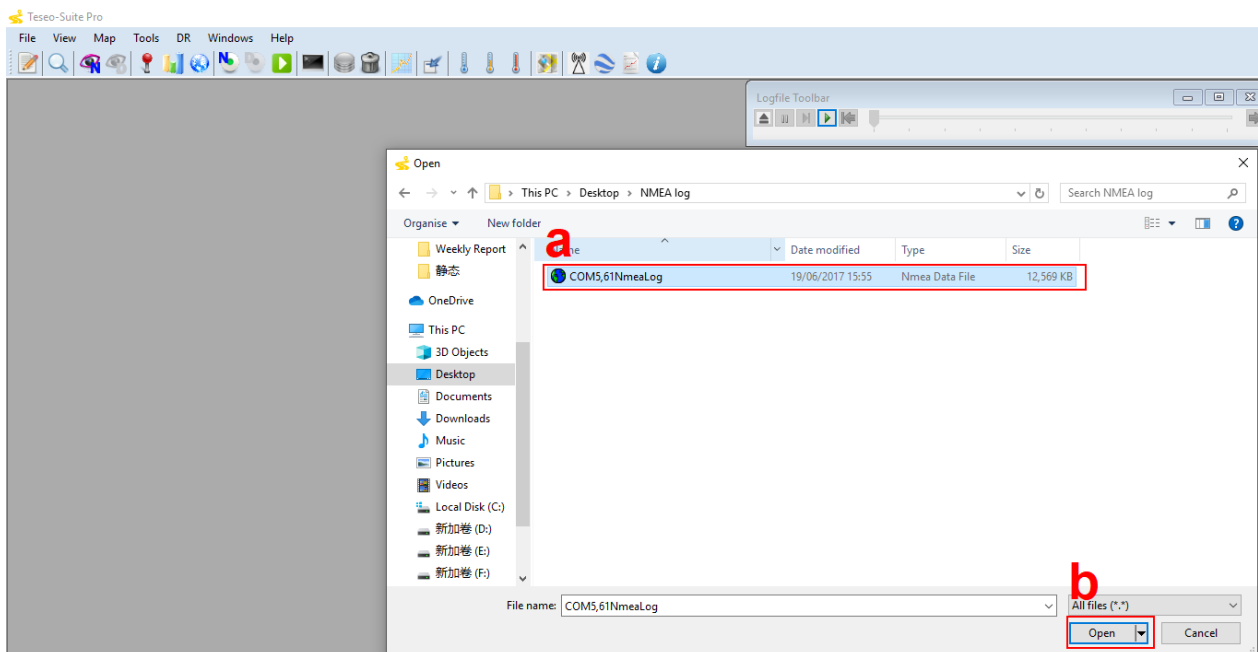


Figure 20: NMEA Log Playback Step 1

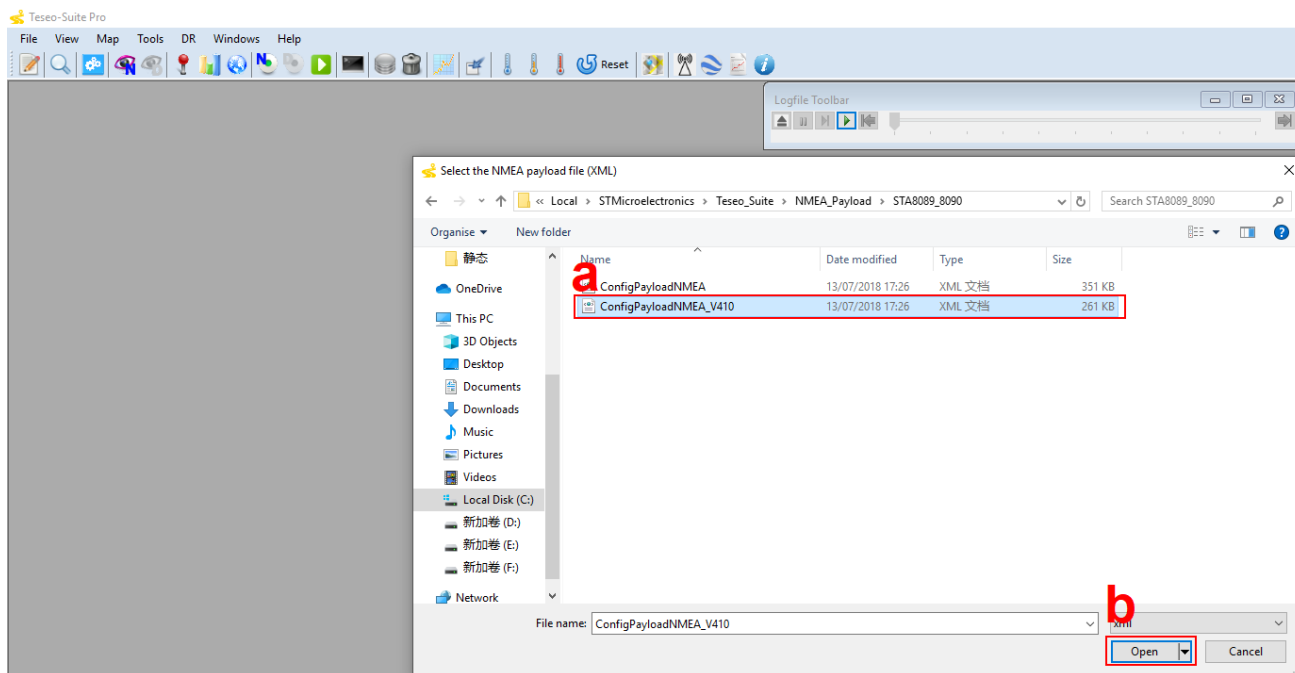


Figure 21: NMEA Log Playback Step 2

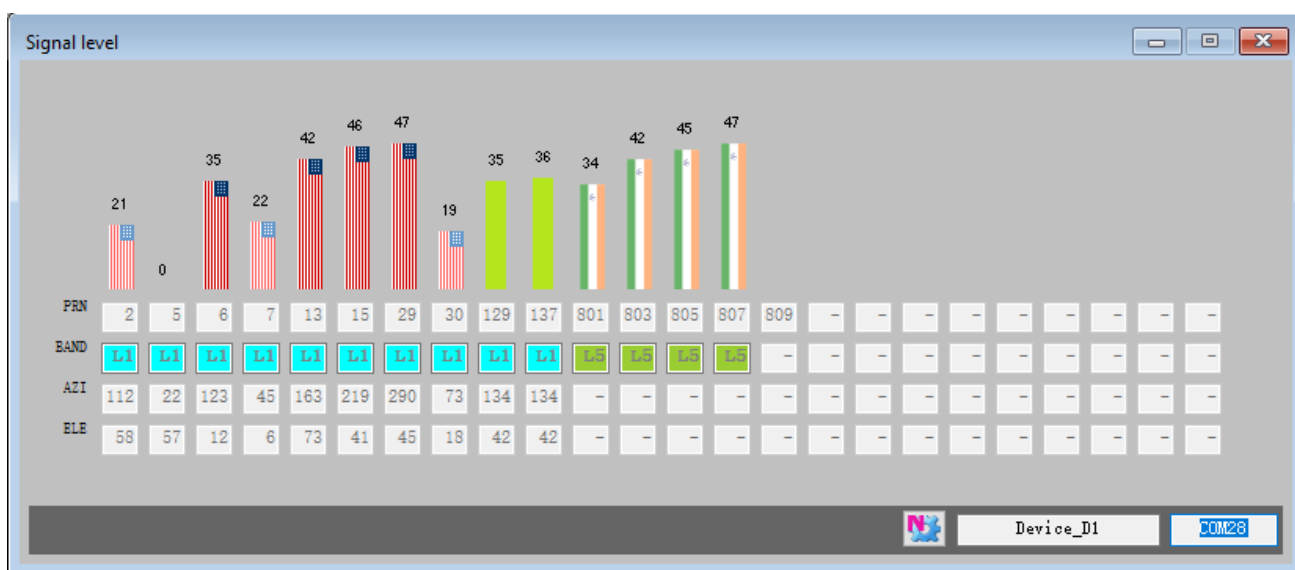


Figure 22: Generated IRNSS Satellite Histogram

6 Appendix A Reference

Table 7: Terms and Abbreviations

Abbreviation	Description
CNR	Carrier-to-Noise Ratio
DI	Digital Input
DO	Digital Output
EVB	Evaluation Board
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IO	Input/output (Bidirectional)
LED	Light Emitting Diode
LNA	Low Noise Amplifier
PI	Power Input
PPS	Pulse Per Second
PRN	Pseudorandom Noise
SV	Satellite Vehicle
TTFF	Time To First Fix
UTC	Universal Time Coordinated
WGS84	World Geodetic System 1984