

LC98S EVB 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

Or our local offices. For more information, please visit:

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Safety Information

The following safety precautions must be observed during all phases of operation, such as usage, service or repair of any terminal incorporating Quectel LC98S module. Manufacturers of the terminal should distribute the following safety precautions to users and operating personnel, and incorporate them into all manuals supplied with the product. Otherwise, Quectel assumes no liability for customers' failure to comply with these precautions.



Ensure that the product may be used in the country and the required environment, as well as that it conforms to the local safety and environmental regulations.



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, while the wiring must conform to security precautions and fire prevention regulations.



Proper ESD handling procedures must be followed throughout the mounting, handling and operation of any devices and equipment incorporating the module to avoid ESD damages.

About the Document

Document Information

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1 Introduction

This document provides information on the steps needed to evaluate the Quectel LC98S module using the Evaluation Board (EVB). The EVB is a convenient tool that allows you to become familiar with the LC98S module.

Specifically, the document is divided into several sections:

- Chapter 2 provides the general overview of EVB Kit.
- Chapter 3 describes the EVB user interfaces.
- Chapter 4 describes how to communicate with the module via QCOM tool.
- Chapter 5 describes how to test the module via QGNSS tool.
- Chapter 6 describes how to upgrade module firmware via GNSSFlashTool.
- Chapter 7 is an appendix, which summarizes the relevant documents and terms and abbreviations appearing herein.

NOTE

For EVB schematic and PCB layout design files, contact Quectel Technical Support (support@quectel.com).

2 General Overview

2.1. EVB Kit

The EVB Kit includes: Evaluation Board (EVB), Active GNSS Antenna, Micro-USB Cable, USB flash drive, Bolts and Coupling Nuts. Download the software tools (QCOM, QGNSS, GNSSFlashTool) from our website [Download Zone](#) or request them from Quectel Technical Support.

The EVB Kit contents are shown in the figure below. Check **Table 1** for details.

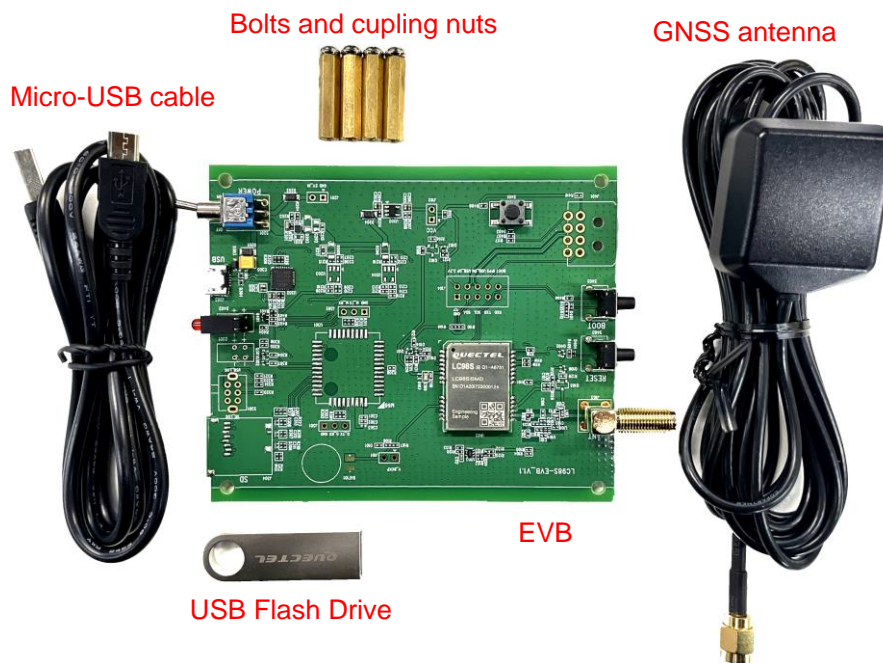


Figure 1: EVB and Components

Table 1: List of Kit Components

Items	Description	Quantity
EVB	Evaluation Board Size: 100 mm x 84 mm	1

USB Cable	Micro-USB Cable	1
USB Flash Drive	8 GB USB Flash Drive (including the module-related documents, tools, and drivers)	1
GNSS Antenna	Active GNSS Antenna Request the Antenna Datasheet from Quectel Technical Support.	1
Instruction Sheet	Sheet providing instructions on how to connect the EVB and its components, detailed information on EVB contents, etc.	1
Others	Bolts and Coupling Nuts	4 pairs

2.2. Connect Cables and Antenna to EVB

The connection between the EVB and its components is shown in the figure below. For more information on how to connect the EVB and its components, refer to the instruction sheet inside the EVB Kit.

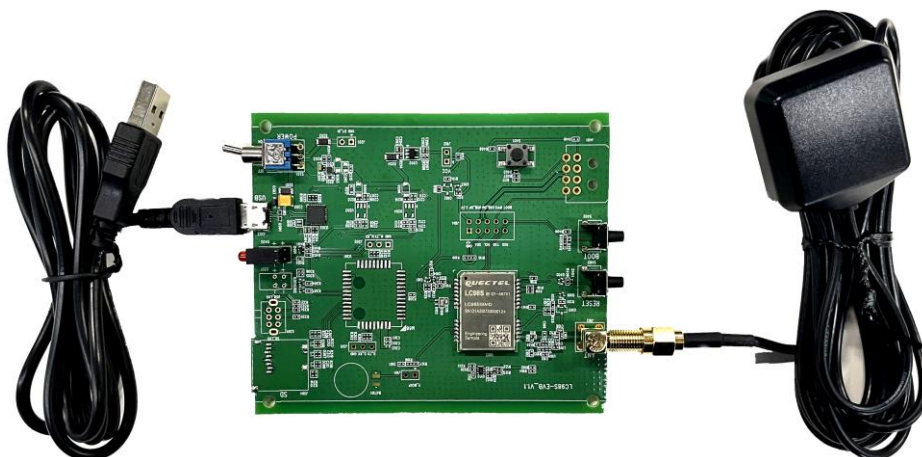


Figure 2: EVB and Components Assembly

NOTE

Make sure that the Active GNSS Antenna is placed with a clear line of sight to the sky.

3 EVB User Interfaces

3.1. EVB Top View

EVB top view is shown in the figure below.

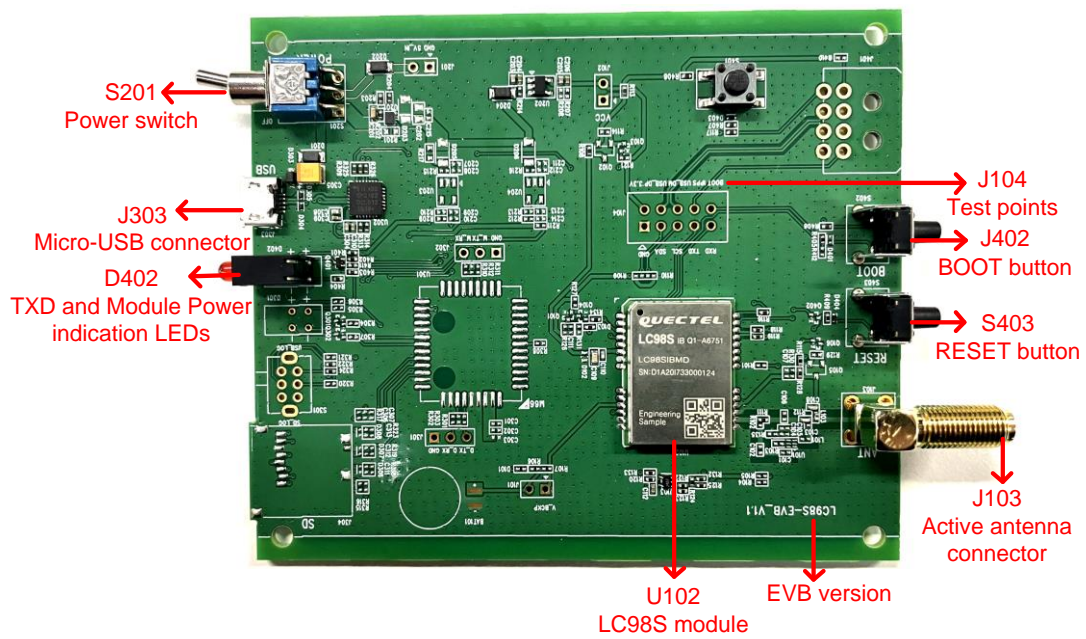


Figure 3: EVB Top View

3.2. EVB Interfaces

The EVB interfaces are detailed in the table below.

Table 2: Detailed EVB Interfaces

Function	Interfaces	Description	
Power Supply	J303 Micro-USB	Power supply input: <ul style="list-style-type: none"> ● DC power supply: 4.5–5.5 V, typ. 5.0 V ● Current capability should be > 100 mA 	
Communication Interface	J303 Micro-USB	Standard NMEA sentence output and PSTM command input and output.	
RF Input	J103 Active antenna connector	The antenna in the kit supports: <ul style="list-style-type: none"> ● GPS L1 C/A ● GLONASS L1 ● Galileo E1 ● BDS B1I ● QZSS L1 C/A ● SBAS L1 	
Signal Indication	D402 Indication LEDs	TXD (Red LED)	Flashing: Data are output from UART TXD pin. Extinct or Bright: No data are output form UART TXD pin.
		Module Power (Green LED)	Bright: The module is powered on. Extinct: The module is powered off.
Switches and Buttons	S201 Power switch	Power the EVB on/off.	
	S402 BOOT button	Press and hold the BOOT button before powering on the EVB to put the module into Boot download mode.	
	S403 RESET button	Short press on the button to reset the module.	
Test Points	J104 Test points	Pins are detailed in Table 3 and Table 4 below.	

The test point assignment is shown below:

Table 3: J104 Pin Assignment

RXD	TXD	SCL	SDA	GND
BOOT	1PPS	USB_DM	USB_DP	3.3V

Table 4: J104 Pin Detailed Description

Pin Name	I/O	Description
RXD	DI	Receives data
TXD	DO	Transmits data
SCL	-	NC
SDA	-	NC
GND	-	Ground
BOOT	DI	Forces the module to enter Boot download mode
1PPS	DO	One pulse per second
USB_DM	-	NC
USB_DP	-	NC
3.3V	PO	3.3 V output

4 Communication via QCOM Tool

This chapter explains how to use the QCOM tool to communicate with the module via the Micro-USB interface. For more information, see [document \[1\]](#).

Download the QCOM tool from our website [Download Zone](#) or request it from Quectel Technical Support.

4.1. Communication via the Micro-USB Interface

Step 1: Connect the EVB and the PC with a Micro-USB cable via the Micro-USB interface.

Step 2: Flip the Power switch (S201) to **ON** position to power on the EVB.

Step 3: Run the provided driver installer to install the USB driver.

Step 4: View the USB port number in the Device Manager, as shown in the figure below.



Figure 4: USB Port

Step 5: Install the QCOM tool provided by Quectel. The COM Port Setting interface of QCOM is shown in the figure below (Default value: 115200 bps ¹).

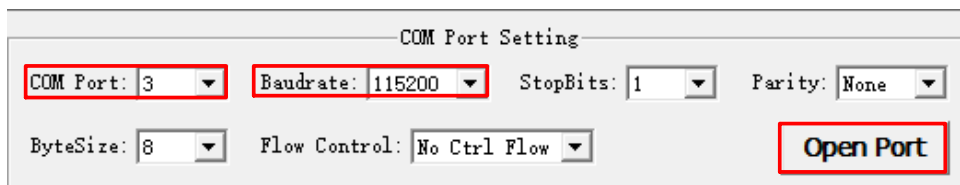


Figure 5: COM Port Setting Interface of QCOM

Step 6: Select the correct “COM Port” (USB Port shown in [Figure 4](#) above).

¹ UART interface default settings vary depending on software versions.

Step 7: Set the correct “Baudrate”.

Step 8: Click “Open Port” to establish communication with the EVB. The NMEA sentences output by the module will be displayed in the receiving bar of the QCOM tool, as shown in the figure below.

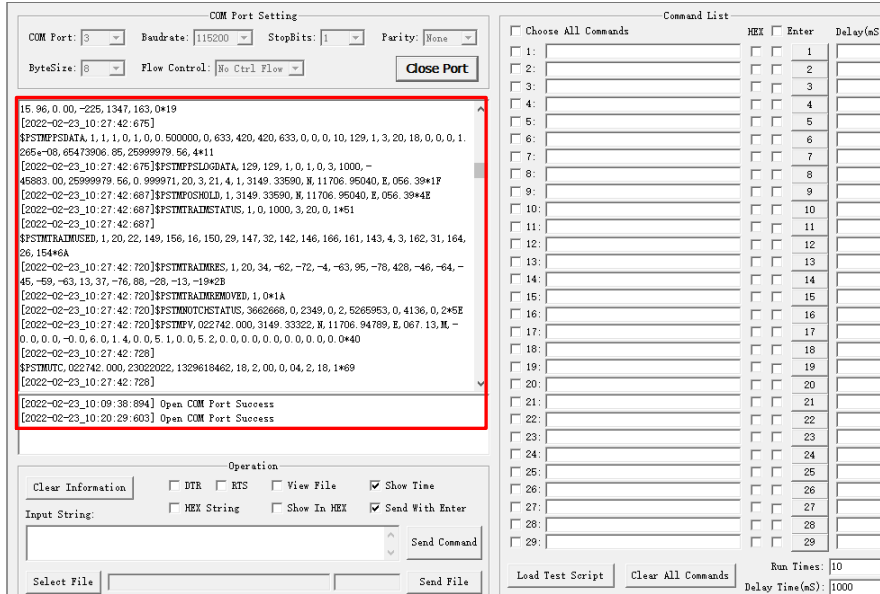


Figure 6: NMEA Sentences Output – Displayed on QCOM Tool Interface

5 Test via QGNSS Tool

This chapter explains how to use the QGNSS software tool for verifying the status of GNSS module. For more information about QGNSS use, see **document [2]**.

Download the QGNSS tool from our website [Download Zone](#) or request it from Quectel Technical Support.

5.1. QGNSS Setting

Step 1: Assemble the EVB components.

Step 2: Flip the Power switch (S201) to **ON** position to power on the EVB.

Step 3: Start the QGNSS and click **“Setting”** and **“Serial Port Configuration”** (Default baud rate: 115200 bps ²), as shown in the figure below.

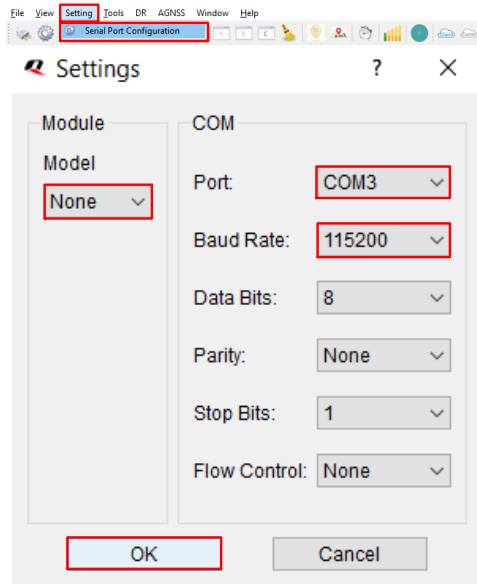



Figure 7: COM Port and Baud Rate Setting

Step 4: Click the  **“Connect or disconnect”** button. The interface shown in the figure below appears once the module is connected.

² UART interface default settings vary depending on software versions.

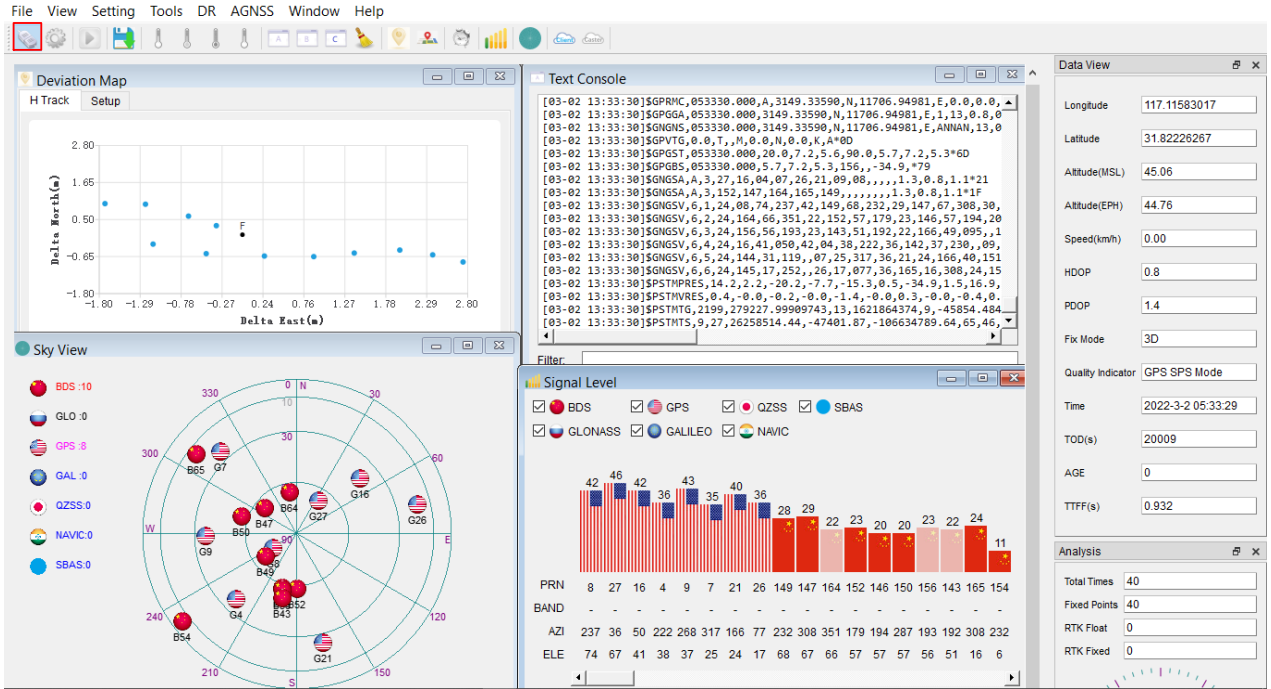
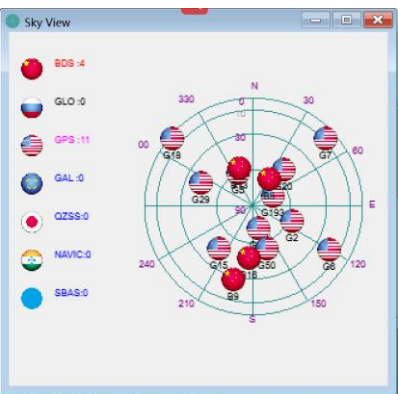


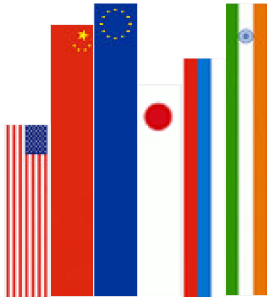
Figure 8: QGNSS Interface (Connected)





5.1.1. QGNSS Interface Explanation

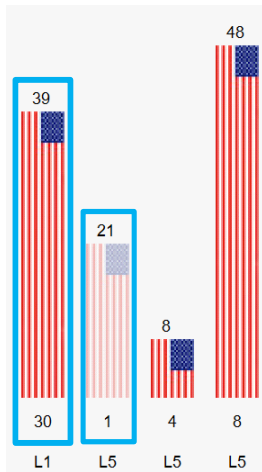
You can view GNSS information, such as C/N₀ message, time, position, speed, and precision in the QGNSS interface. See the following table to find out more about these parameters.

Table 5: QGNSS Interface Explanation

Icon	Explanation
	<p>This sky view interface shows the position of the satellites in use.</p> <ol style="list-style-type: none"> The left column icons show the satellites in use and their number. <ul style="list-style-type: none"> ● BDS: 4 ● GLO (GLONASS): 0 ● GPS: 11 ● GAL (Galileo): 0 ● QZSS: 0 ● NAVIC (IRNSS): 0 ● SBAS: 0 The grid map on the right shows the position of the satellites in use.



-  GPS satellite
-  BDS satellite
-  GLONASS satellite
-  Galileo satellite
-  QZSS satellite
-  NavIC satellite



- PRN 30 C/N₀ is 39 dB-Hz.
- Column in **bright red** means that the navigation data of the satellites are in use.
- PRN 1 C/N₀ is 21 dB-Hz.
- Column in **light red** means that the navigation data of the satellites are not in use.

Data View

Longitude	117.11518985
Latitude	31.82222998
Altitude(MSL)	49.73
Altitude(EPH)	49.40
Speed(km/h)	0.00
HDOP	0.73
PDOP	
Quality Indicator	DGNSS
Time	2021-9-22 05:54:50
TOD(s)	21290
AGE	0
TTFF(s)	

- Longitude (unit: degree)
- Latitude (unit: degree)
- Altitude (MSL) (unit: m)
- Altitude (EPH) (unit: m)
- Receiver speed (unit: km/h)
- Horizontal dilution of precision
- Position dilution of precision
- Quality Indicator: DGNSS, DGPS, GPS SPS mode.
- UTC date and time
- Time of day ³ (unit: second)
- Age of differential GPS data
- Last TTFF (unit: second)

³ Total number of seconds elapsed since midnight of the current day.


Analysis ✕

Total Times

Fixed Points

RTK Float

RTK Fixed



- Total Times
- Fixed Points
- RTK Float
- RTK Fixed

6 Firmware Download via GNSSFlashTool

Quectel LC98S module upgrades firmware via the UART interface using GNSSFlashTool.

Download the GNSSFlashTool from our website [Download Zone](#) or request it from Quectel Technical Support.

6.1. Firmware Download in Boot Download Mode

Before you start the firmware download process:

First: Connect the EVB to a PC with a Micro-USB cable.

Second: Flip the Power switch (S201) to **OFF** position before powering on the EVB.

Firmware download steps in Boot download mode:

Step 1: Open GNSSFlashTool and select “**L89L26LC98S_Download**” for LC98S module in the drop-down box of “**Tool Options**”, as shown in the figure below.



Figure 9: Firmware Download – Step 1

Step 2: Click “**Open File**” to select firmware of the module, e.g., “**LC98SIBNR01A01V01_BOOT.bin**” for LC98S module, as shown in the figures below.

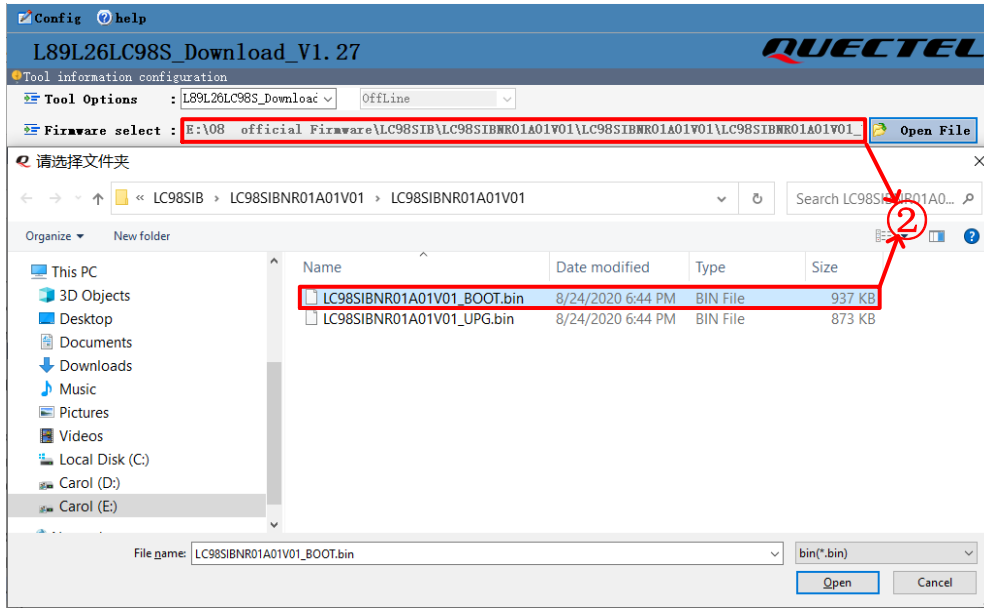


Figure 10: Firmware Download – Step 2

Step 3: Select the “Port” and “Baud Rate” and then click “Start” button. Press and hold the BOOT button before flipping the power switch (S201) to **ON** position, and then release the BOOT button to enter Boot Download mode.

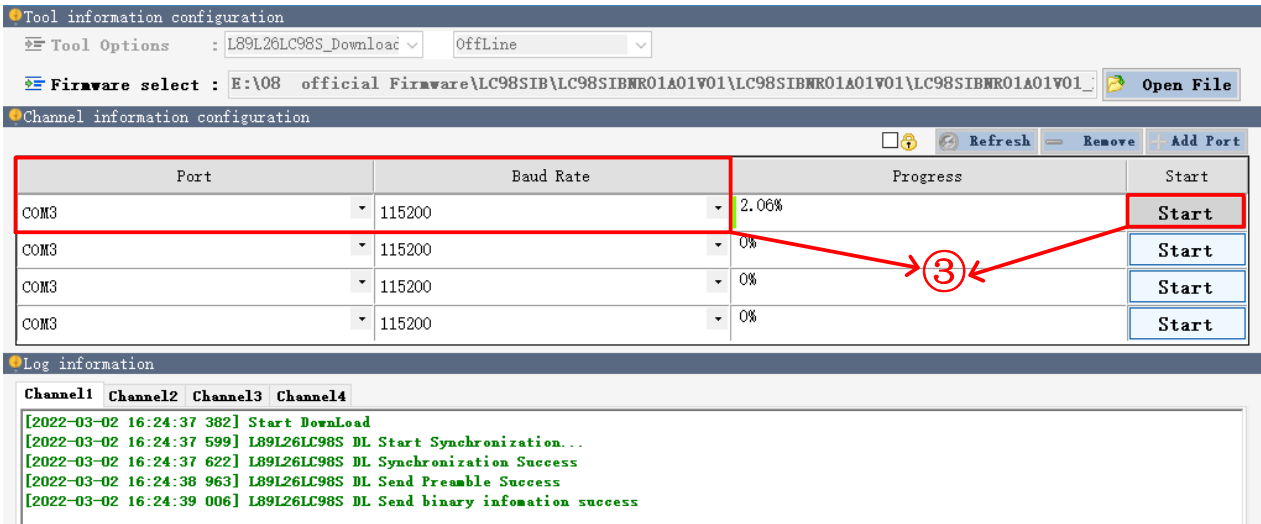


Figure 11: Firmware Download – Step 3

Step 4: Upon successful firmware upgrade, the GNSSFlashTool green progress bar on the screen will indicate “PASS”, as shown in the figure below.

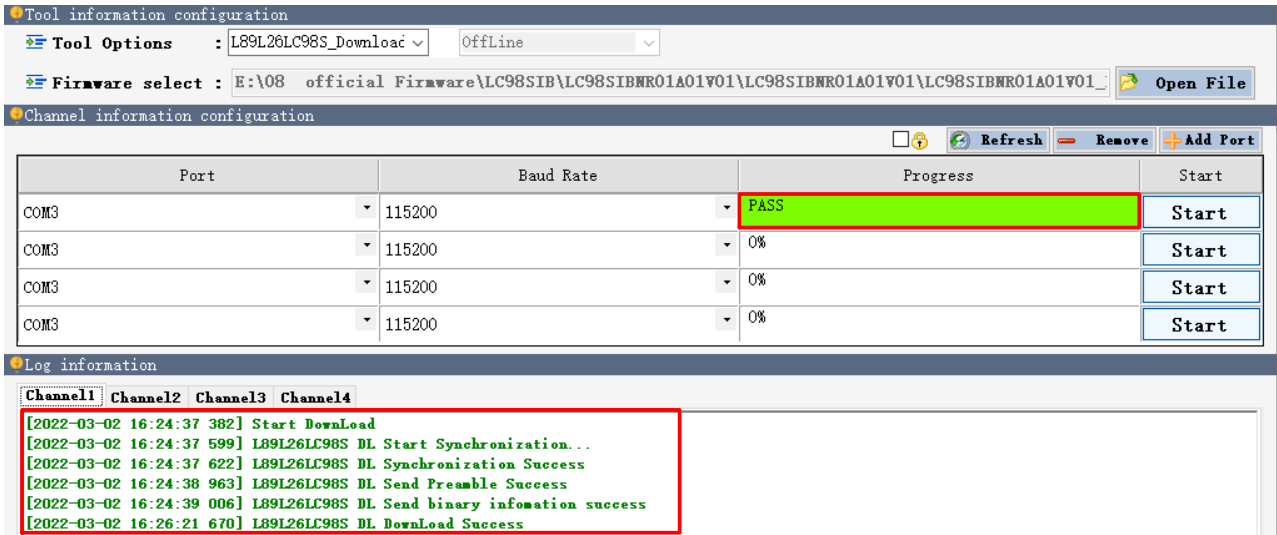


Figure 12: Successful Firmware Download – Step 4

6.2. Firmware Upgrade in Normal Operating Mode

Before you start the firmware upgrade process:

First: Connect the EVB to a PC with a Micro-USB cable.

Second: Flip the Power switch (S201) to **OFF** position to power on the EVB.

Firmware upgrade steps in Normal operating mode:

Step 1: Open GNSSFlashTool and select “**L89L26LC98S_Upgrade**” for LC98S module in the drop-down box of “**Tool Options**”, as shown in the figure below.

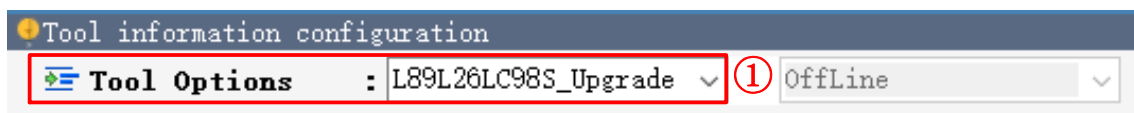


Figure 13: Firmware Upgrade - Step 1

Step 2: Click “Open File” to select firmware of the module, e.g., “**LC98SIBNR01A01V01_UPG.bin**” for LC98S module, as shown in the figures below.

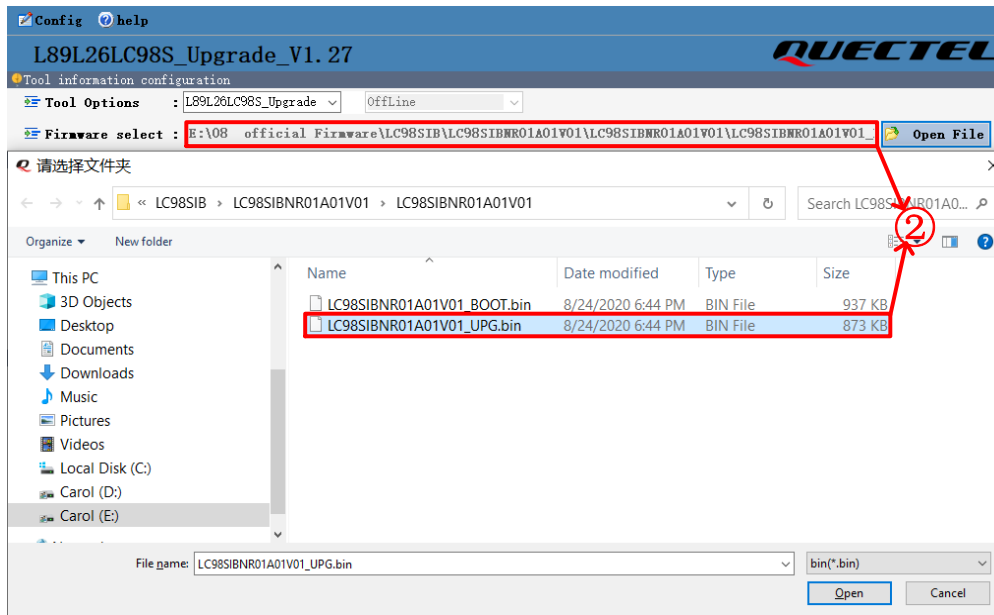


Figure 14: Firmware Upgrade – Step 2

Step 3: Select the “Port” and “Baud Rate”. Click “Start” button and then flip the power switch (S201) to ON position

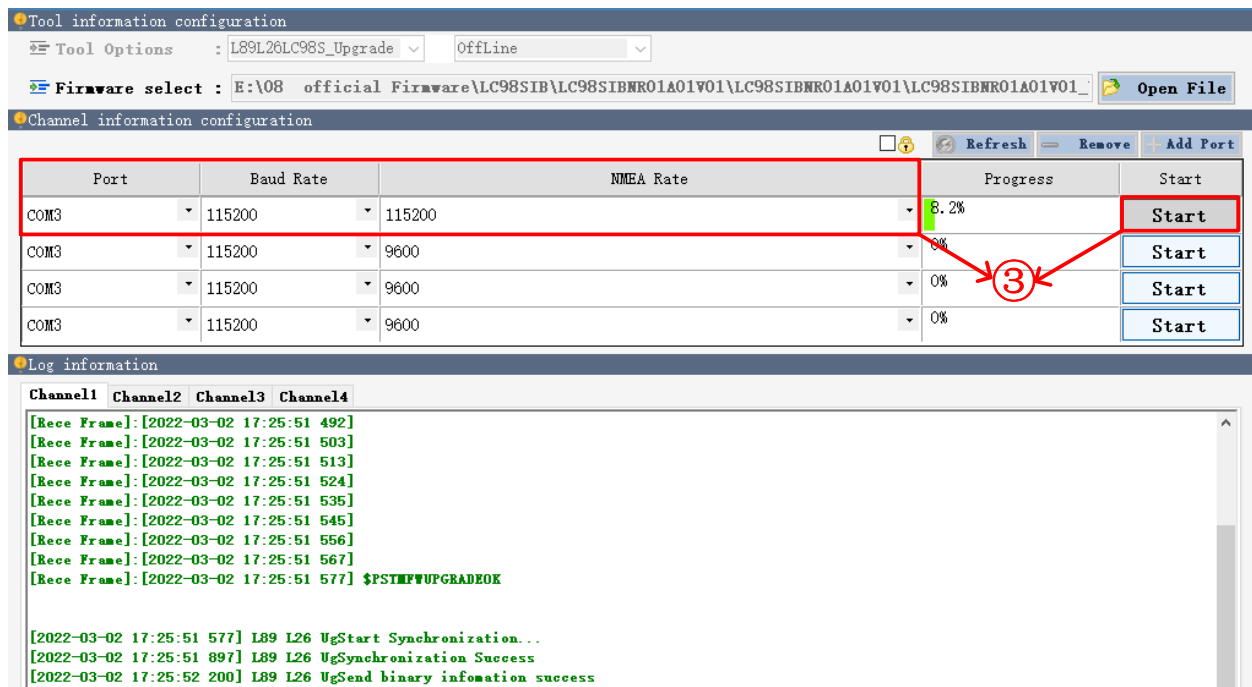


Figure 15: Firmware Upgrade - Step 3

Step 4: Upon successful firmware upgrade, the GNSSFlashTool green progress bar on the screen will indicate “PASS”, as shown in the figure below.

Tool information configuration

Tool Options : LB9L26LC98S_Upgrade OffLine

Firmware select : E:\08 official Firmware\LC98SIB\LC98SIBNR01A01V01\LC98SIBNR01A01V01\LC98SIBNR01A01V01_ Open File

Channel information configuration

Port	Baud Rate	NMEA Rate	Progress	Start
COM3	115200	115200	PASS	Start
COM3	115200	9600	0%	Start
COM3	115200	9600	0%	Start
COM3	115200	9600	0%	Start

Log information

```

Channel1 Channel2 Channel3 Channel4
[Rece Frame]:[2022-03-02 17:25:51 503]
[Rece Frame]:[2022-03-02 17:25:51 513]
[Rece Frame]:[2022-03-02 17:25:51 524]
[Rece Frame]:[2022-03-02 17:25:51 535]
[Rece Frame]:[2022-03-02 17:25:51 545]
[Rece Frame]:[2022-03-02 17:25:51 556]
[Rece Frame]:[2022-03-02 17:25:51 567]
[Rece Frame]:[2022-03-02 17:25:51 577] $PSTMP#UPGRADEOK

[2022-03-02 17:25:51 577] L89 L26 UgStart Synchronization...
[2022-03-02 17:25:51 897] L89 L26 UgSynchronization Success
[2022-03-02 17:25:52 200] L89 L26 UgSend binary infomation success
[2022-03-02 17:27:29 724] L89 L26 UgUpgrade Success
    
```

Figure 16: Successful Firmware Upgrade – Step 4

NOTE

Make sure the module is in Continuous mode before downloading firmware in Normal operating mode.

7 Appendix References

Table 6: Related Documents

Document Name
[1] Quectel QCOM User Guide
[2] Quectel QGNSS User Guide

Table 7: Terms and Abbreviations

Abbreviation	Description
2D	2 Dimension
3D	3 Dimension
BDS	BeiDou Navigation Satellite System
CEP	Circular Error Probable
COM Port	Communication Port
DC	Direct Current
DI	Digital Input
DO	Digital Output
DR	Dead Reckoning
EPH	Ellipsoidal Height
ESD	Electrostatic Discharge
EVB	Evaluation Board
Galileo	Galileo Satellite Navigation System (EU)
GLONASS	Global Navigation Satellite System (Russia)

GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
I2C	Inter-Integrated Circuit
I/O	Input/Output
IRNSS	Indian Regional Navigation Satellite System
LED	Light Emitting Diode
LNA	Low-Noise Amplifier
Micro-USB	Micro Universal Serial Bus
NAVIC	Indian Regional Navigation Satellite System
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard
PC	Personal Computer
PCB	Printed Circuit Board
PI	Power Input
PO	Power Output
PPS	Pulse Per Second
PRN	Pseudo Random Noise
QZSS	Quasi-Zenith Satellite System
RF	Radio Frequency
RMS	Root Mean Square
RTK	Real Time Kinematic
RXD	Receive Data (Pin)
SBAS	Satellite-Based Augmentation System
SCL	Serial Clock Line
SDA	Serial Data Line

TTFF	Time to First Fix
TXD	Transmit Data (Pin)
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
UTC	Coordinated Universal Time
