L89 R2.0 EVB User Guide

GNSS Module Series

Version: 1.0

Date: 2021-09-29

Status: Released

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

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:
http://www.quectel.com/support/sales.htm.

For technical support, or to report documentation errors, please visit:
http://www.quectel.com/support/technical.htm.
Or email us at: support@quectel.com.

Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

Use and Disclosure Restrictions

License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

Copyright

Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

Third-Party Rights

This document may refer to hardware, software and/or documentation owned by one or more third parties ("third-party materials"). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

Disclaimer

a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.

b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.

c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.

d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

Safety Information

The following safety precautions must be observed during all phases of operation, such as usage, service, or repair of any cellular or mobile terminal incorporating L89 R2.0 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 the use of the product conforms to the local safety and environment regulations and is allowed to be used in the country and in the required environment.
	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 comply with security precautions and fire prevention regulations.
	Proper ESD handling procedures must be followed throughout the mounting, handling and operation of any application incorporating the module to avoid ESD damages.

About the document

Document Information	
Title	**L89 R2.0 EVB User Guide**
Subtitle	GNSS Module Series
Document Type	EVB User Guide
Document Status	Released

Revision History

Version	Date	Description
-	2021-04-15	Creation of the document
1.0	2021-09-29	First official release

Contents

Safety Information **3**
About the document **4**
Contents **5**
Table Index **6**
Figure Index **7**

1 Introduction **8**

2 General Overview **9**
2.1. EVB Kit Accessories 9
2.2. Connecting Cables and Antenna to EVB 10

3 EVB Interfaces **12**
3.1. EVB Top View 12
3.2. EVB Interfaces 13

4 Communicating via QCOM Tool **15**

5 Testing via QGNSS Tool **17**
5.1. COM Port and Baud Rate Setting 17
5.1.1. Interface Explanation 18

6 Firmware Upgrade via QGPSFlashTool **20**

7 Appendix References **23**

Table Index

Table 1: List of Accessories 10
Table 2: Detailed EVB Interfaces 13
Table 3: J401 Pin Assignment 14
Table 4: Detailed Description of J401 Pin 14
Table 5: QGNSS Interface Explanation 18
Table 6: Related Documents 23
Table 7: Terms and Abbreviations 23

Figure Index

Figure 1: EVB Kit Accessories 9
Figure 2: EVB and Accessories Assembly 10
Figure 3: EVB Top View 12
Figure 4: USB Port 15
Figure 5: COM Port Setting Interface of QCOM 15
Figure 6: NMEA Sentences Output – Displayed on QCOM Tool Interface 16
Figure 7: QGNSS Setting 17
Figure 8: QGNSS Interface (Connected) 18
Figure 9: Firmware Upgrading – Step 1 20
Figure 10: Firmware Upgrading – Step 2 21
Figure 11: Firmware Upgrading – Step 3 21
Figure 12: Firmware Upgrading – Step 4 22
Figure 13: Successful Firmware Upgrading 22

1 Introduction

This document provides infomation on the steps needed to evaluate the Quectel L89 R2.0 module using the Evaluation Board (EVB). The EVB is a reference tool that allows you to become familiar with the L89 R2.0 module.

Specifically, the document is divided into several sections:

- Chapter 2 provides the general overview of EVB kit accessories;
- Chapter 3 describes the EVB 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 the module via QGPSFlashTool tool;
- Chapter 7 is an appendix, which summarizes the relevant documents, terms, and abbreviations appearing herein.

NOTE

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

2 General Overview

2.1. EVB Kit Accessories

The EVB kit includes: Evaluation Board (EVB), active GNSS antenna, Micro-USB cable, bolts and coupling nuts. Download the software tools (QCOM, QGNSS and QGPSFlashTool) from our website Download Zone or contact Quectel Technical Supports.

The EVB kit accessories are shown in the figure below. For more information, see ***Table 1***.

Figure 1: EVB Kit Accessories

Table 1: List of Accessories

Items	Description	Quantity
EVB	Evaluation Board Size: 80 mm × 100 mm	1
USB Cable	Micro-USB cable	1
GNSS Antenna	L89 R2.0 active GNSS antenna Request the antenna datasheet from Quectel Technical Supports.	1
Instruction Sheet	The document provides instructions on how to connect the EVB and its accessories, detailed information on EVB accessories, etc.	1
Others	Bolts and coupling nuts	4 pairs

2.2. Connecting Cables and Antenna to EVB

The connection between the EVB and its accessories is shown in the figure below. For detailed information, refer to the instruction sheet with the EVB kit.

Figure 2: EVB and Accessories Assembly

NOTE

Place the active GNSS antenna where it can detect the satellites with a clear view of the sky.

3 EVB Interfaces

3.1. EVB Top View

EVB top view is shown in the figure below.

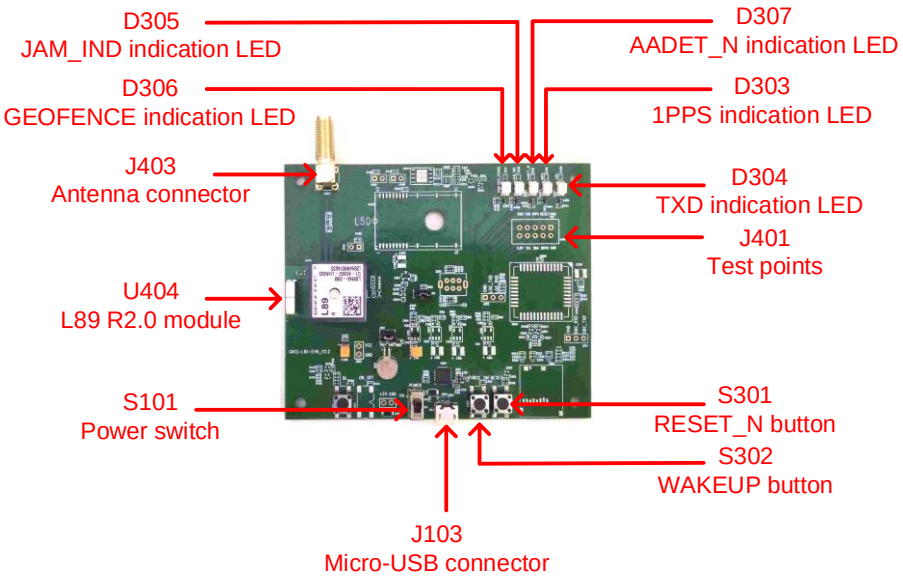


Figure 3: EVB Top View

3.2. EVB Interfaces

The EVB interfaces are detailed in the table below.

Table 2: Detailed EVB Interfaces

Function	Interfaces	Description
Power Supply	J103 Micro-USB	Power supply input: ● DC power supply: 4.5–5.5 V, typ. 5.0 V ● Current capability should be >200 mA
User Interface	J103 Micro-USB	NMEA sentence output and command input.
RF Input	J403 Antenna Connector	The antenna in the kit supports: ● GPS/QZSS L1 C/A ● Galileo E1 ● GLONASS L1 ● BeiDou B1I ● IRNSS L5 ● SBAS L1
Signal Indication	D303 1PPS Indication LED	Flashing: Successful position fix. Frequency: 1 Hz. Extinct: No position fix.
	D304 TXD Indication LED	Flashing: Data output from UART TXD pin. Extinct or Bright: No data output from UART TXD pin.
	D305 JAM_IND Indication LED	Flashing: There is some jamming that may interfere with the desired signal(s). Extinct: There is no jamming.
	D306 GEOFENCE Indication LED	Flashing: Output high level. Extinct: Output low level. The output level state of this pin is configurable. For more information, see ***document [3]***.
	D307 AADET_N Indication LED	Flashing: External active antenna is being used. Extinct: Internal antenna is being used.
Switch and Button	S101 Power Switch	Powers the EVB on/off.
	S301 RESET_N Button	Press the button for a short time to reset the L89 R2.0 module.

	S302 WAKEUP Button	press the button for a short time and then release to wake up the module from Backup mode.
Test Points	J401 Test Points	Pins are detailed in ***Table 3*** below.

Test point distribution is shown below:

Table 3: J401 Pin Assignment

RXD	TXD	1PPS	RESET_N	GND
3.0V	SCL	SDA	3D_FIX	GND

Table 4: Detailed Description of J401 Pin

Pin Name	I/O	Description
3.0V	PI	NC
SCL	I/O	I2C serial clock
SDA	I/O	I2C serial data
3D_FIX	DO	3D fix indication
GND	-	Ground
RXD	DI	Receives data
TXD	DO	Transmits data
1PPS	DO	1 pulse per second
RESET_N	DI	Resets the module
GND	-	Ground

4 Communicating 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 on QCOM tool use, see ***document [1]***.

The specific steps are as follows:

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

Step 2: Flip the power switch (S101) 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.

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.

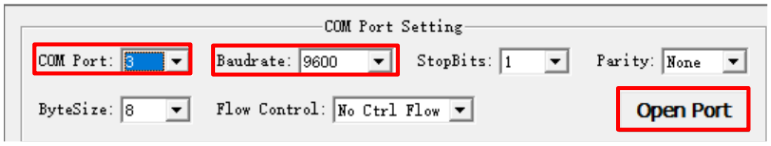


Figure 5: COM Port Setting Interface of QCOM

Step 6: Select the correct **"COM Port"** (USB Port shown in ***Figure 4*** above).

Step 7: Set the correct **"Baudrate"** (default value: 9600 bps).

Step 8: Click "**Open Port**" to establish the communication with the EVB. The NMEA sentences output of the module will be displayed in the receiving bar of QCOM tool.

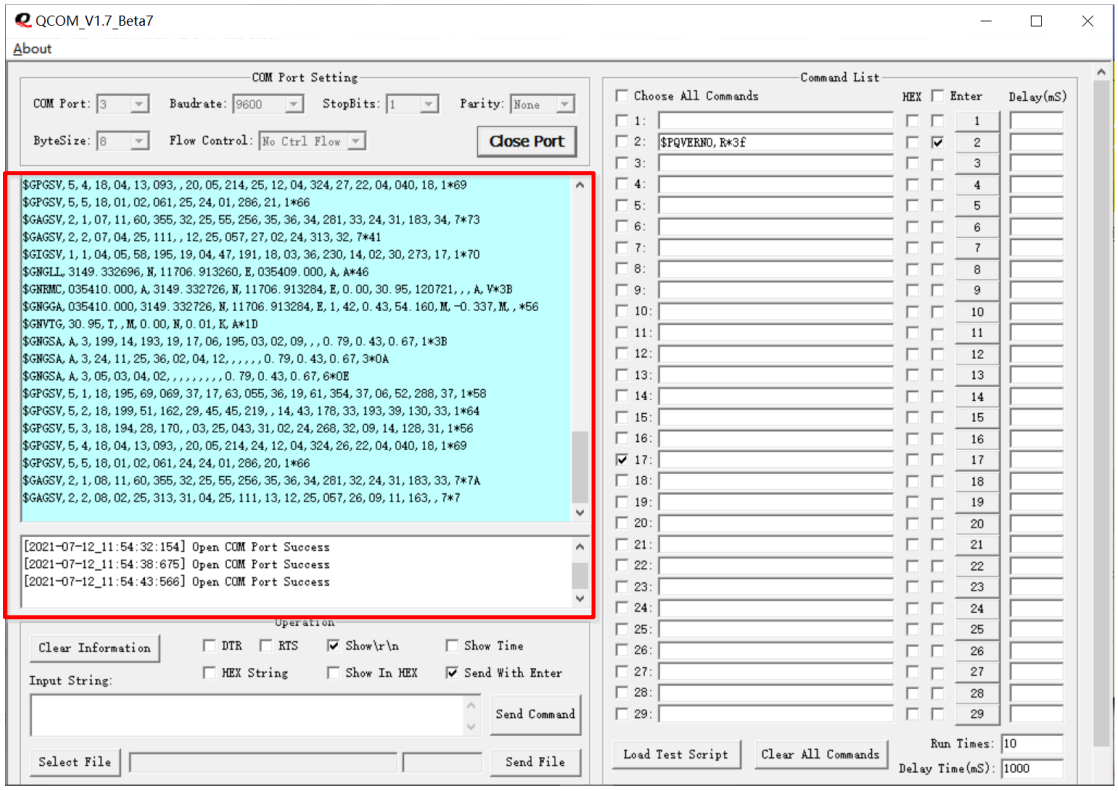


Figure 6: NMEA Sentences Output – Displayed on QCOM Tool Interface

5 Testing via QGNSS Tool

This chapter explains how to use the QGNSS tool for verifying the status of L89 R2.0 module. For more information about QGNSS tool use, see ***document [2]***.

5.1. COM Port and Baud Rate Setting

Step 1: Assemble the EVB accessories.

Step 2: Flip the Power switch (S101) to **ON** position to power on the EVB.

Step 3: Start the QGNSS and click "**Setting**" and "**Serial Port Configuration**" (the L89 R2.0 module supports 9600 bps by default).

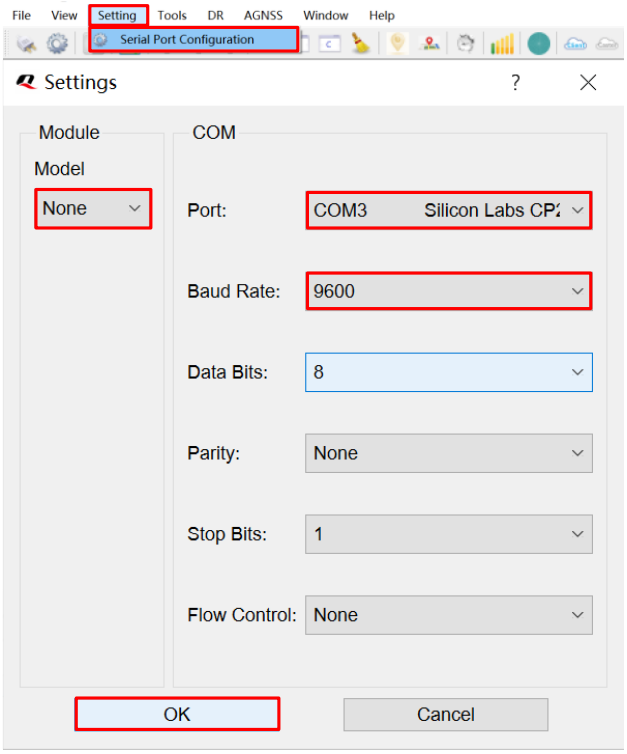


Figure 7: QGNSS Setting

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

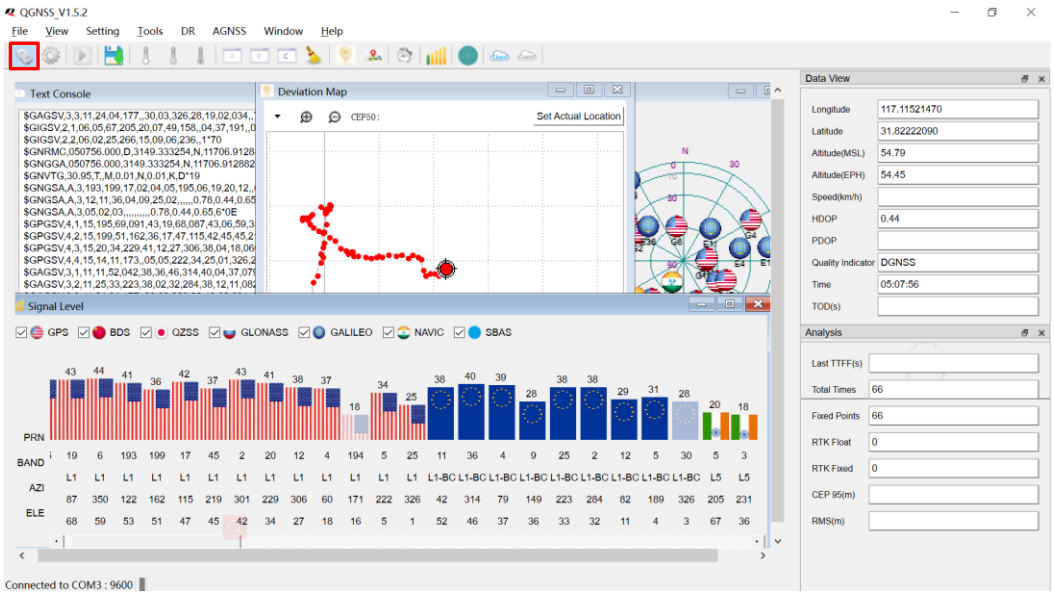
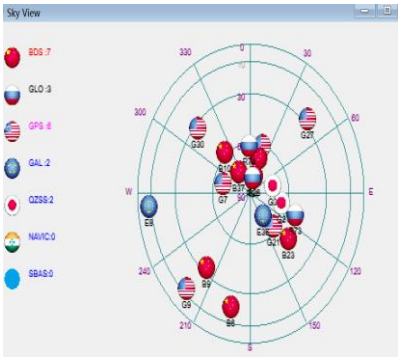


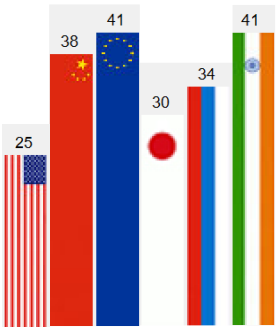
Figure 8: QGNSS Interface (Connected)

5.1.1. Interface Explanation

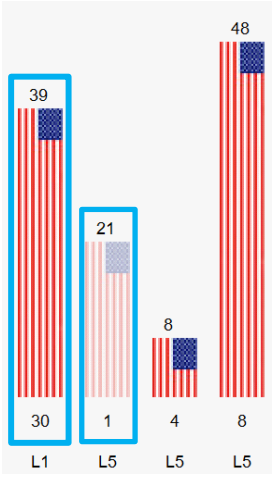
You can view GNSS information, such as CNR message, time, position, speed, and precision in the QGNSS interface. See the following table to find out more about these parameters.

Table 5: QGNSS Interface Explanation

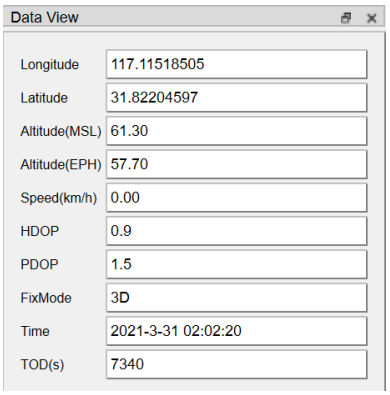
Icon	Explanation
	This sky view interface shows the position of the satellites in use. The left column icons show the satellites in use and their numbers. ● BDS (BeiDou): 4 ● GLO (GLONASS): 0 ● GPS: 11 ● GAL (Galileo): 0 ● QZSS: 0 ● NavIC (IRNSS): 0 ● SBAS: 0 The grid map on the right shows the position of the satellites in use.



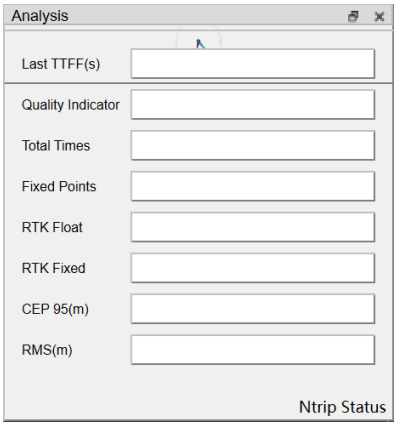
- GPS satellite
- BeiDou satellite
- GLONASS satellite
- Galileo satellite
- QZSS satellite
- NavIC satellite



- PRN 30 CNR is 39 dB/Hz.
- Column in bright red means that the navigation data of the satellite are in use.
- PRN 1 CNR is 21 dB/Hz.
- Column in light red means that the navigation data of this satellite are not in use.



- 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
- Fix Mode
- UTC Date and Time
- Total Duration (unit: second)



- Last TTFF (unit: second)
- Quality Indicator
- Total Times
- Fixed Points
- RTK Float
- RTK Fixed
- CEP 95 (unit: m)
- RMS (unit: m)

6 Firmware Upgrade via QGPSFlashTool

Quectel L89 R2.0 module upgrades firmware via the UART interface using QGPSFlashTool. For more information about QGPSFlashTool tool use, see ***document [4]***.

Before you start the upgrade process:

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

Second: Flip the power switch (S101) to **ON** position to power on the EVB.

Firmware upgrade steps:

Step 1: Start QGPSFlashTool. Click "**Config**", then select "**Options**" and the interface of QGPSFlashTool will pop up as shown in the figure below.

Figure 9: Firmware Upgrading – Step 1

Step 2: In the "**Options**" popup window, set the number of channels to be used. In the "**Tool Options**" drop-down box, select "**L89H**", then click "**OK**".

NOTE

L89 R2.0 is also called L89H.

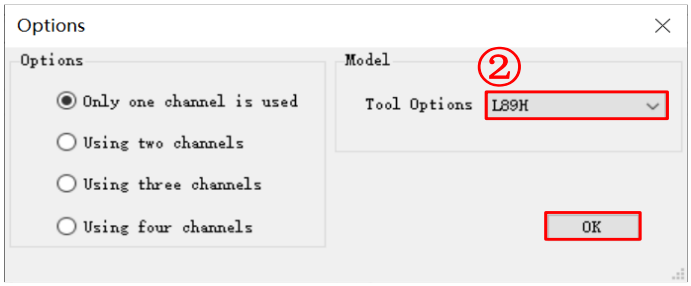


Figure 10: Firmware Upgrading – Step 2

Step 3: Double-click the "**cfg file**" field to the select cfg file, e.g., "flash_download.cfg", as shown the figure below.

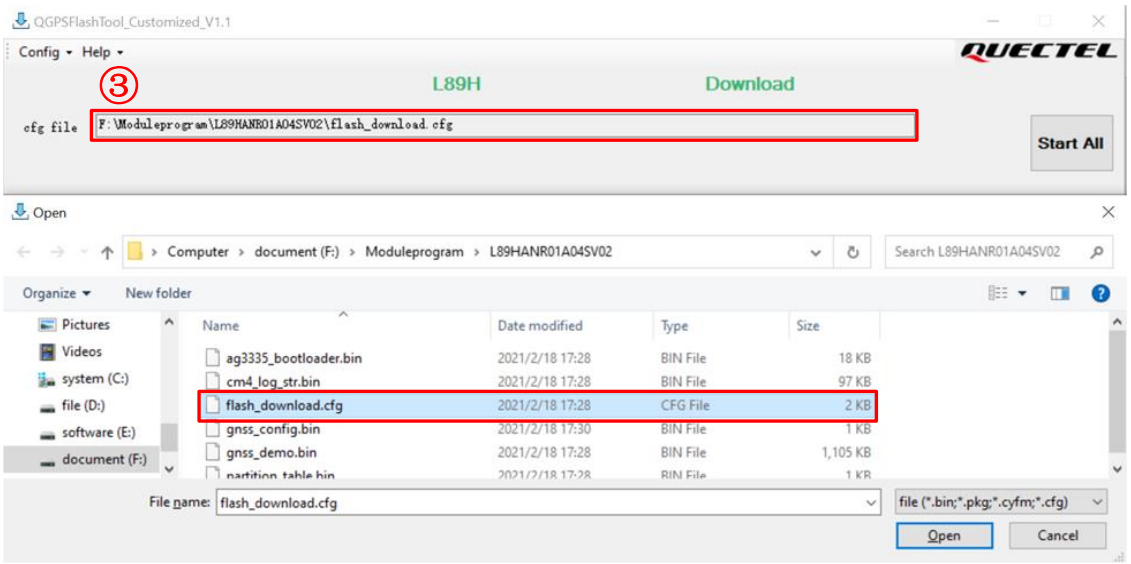


Figure 11: Firmware Upgrading – Step 3

Step 4: Select the "**Serial Port**" and "**Baudrate**" of the used COM Port. If the power switch (S101) is in the **ON** position, after clicking "**Start**" button, press the RESET_N button on the EVB (hold it for 100 ms and then release it) to start downloading. If the EVB is in a power-off state, after clicking "**Start**", flip the power switch (S101) to the **ON** position to start downloading.

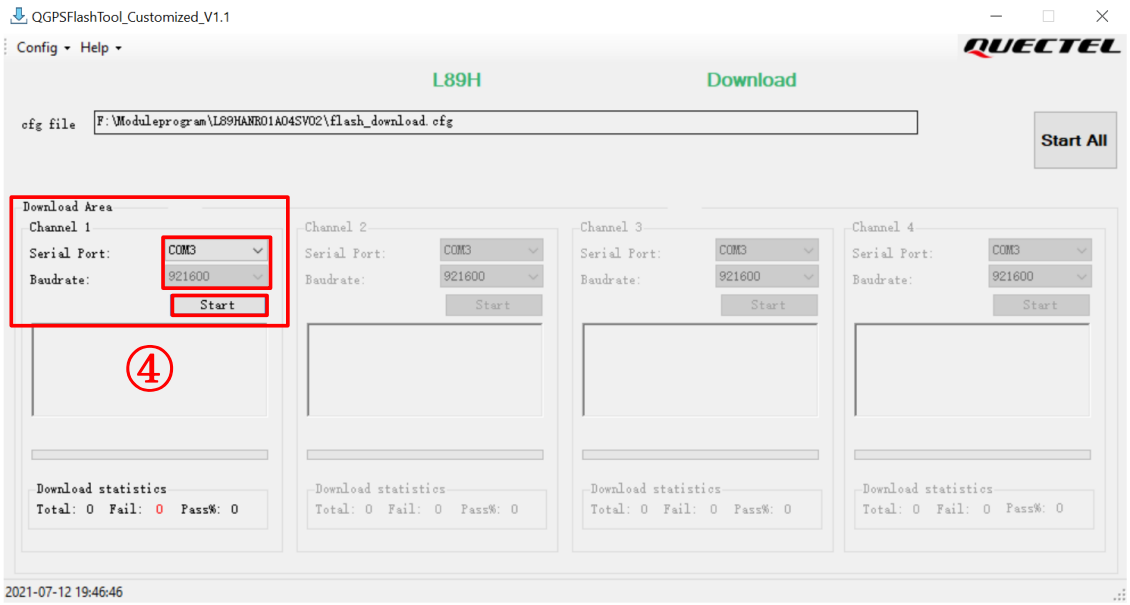


Figure 12: Firmware Upgrading – Step 4

Step 5: When the firmware upgrade is successful, the QGPSFlashTool green progress bar on the screen will indicate 100%, as shown in the figure below.

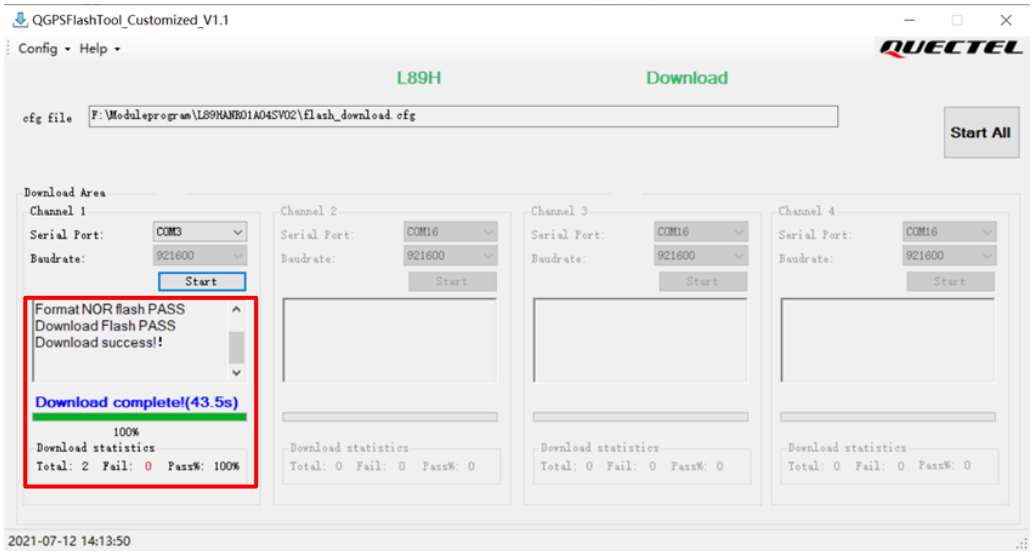


Figure 13: Successful Firmware Upgrading

7 Appendix References

Table 6: Related Documents

Document Name	
[1]	Quectel_QCOM_User_Guide
[2]	Quectel_QGNSS_User_Guide
[3]	Quectel_L89_R2.0_Hardware_Design
[4]	Quectel_QGPSFlashTool_User_Guide

Table 7: Terms and Abbreviations

Abbreviation	Description
2D	2 Dimension
3D	3 Dimension
BeiDou	BeiDou Navigation Satellite System
CEP	Circular Error Probable
CNR	Carrier-to-Noise Ratio
COM Port	Communication Port
DC	Direct Current
DI	Digital Input
DO	Digital Output
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
MSC	Mobile Switching Center
NavIC	Indian Regional Navigation Satellite System
NMEA	National Marine Electronics Association
PC	Personal Computer
PCB	Printed Circuit Board
PI	Power Input
1PPS	One Pulse Per Second
PRN	Pseudorandom 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
SPS	Standard Positioning Service
TTFF	Time to First Fix
TXD	Transmit Data (Pin)
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
UTC	Coordinated Universal Time