L76 Series

EVB User Guide

GNSS Module Series

Version: 2.1

Date: 2021-08-05

Status: Released

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Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

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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 L76-LB module. Manufacturers of the terminal should send the following safety information to users and operating personnel, and incorporate these guidelines 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 that incorporate the module to avoid ESD damages.

About the Document

Document Information	
Title	**L76 Series EVB User Guide**
Subtitle	GNSS Module Series
Document Type	EVB User Guide
Document Status	Released

Revision History

Version	Date	Description
1.0	2013-02-25	Initial
1.1	2013-03-26	Optimized the contents of Chapter 3.
2.0	2016-05-03	1. Changed the document name from Quectel_L76_EVB_User_Guide to Quectel_L76_Series_EVB_User_Guide. 2. Incorporated the related information of L76-L.
2.1	2021-08-05	1. Added the applicable module L76-LB. 2. Updated the overall structure of the document, including but not limited to the adding of Chapters 4, 5 and 6.

Contents

Table Index

Figure Index

1 Introduction

This document provides info on the steps needed to evaluate the Quectel L76 series modules using the Evaluation Board (EVB). The EVB is a reference tool that allows you to become familiar with the L76 series modules.

Specifically, the document is divided into several sections:

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

In this document, Quectel L76 series includes L76, L76-L and L76-LB modules. For the EVB user guide of L76-L (L) and L76-LB (L) modules, see ***document [4]***.

NOTE

If you need EVB schematic and PCB layout design files for reference, request them from 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. You can download the software tools (QCOM, QGNSS, QGPSFlashTool) from our website Download Zone or request them from Quectel Technical Supports.

The EVB Kit accessories are shown in the figure below, and check ***Table 1*** for details.

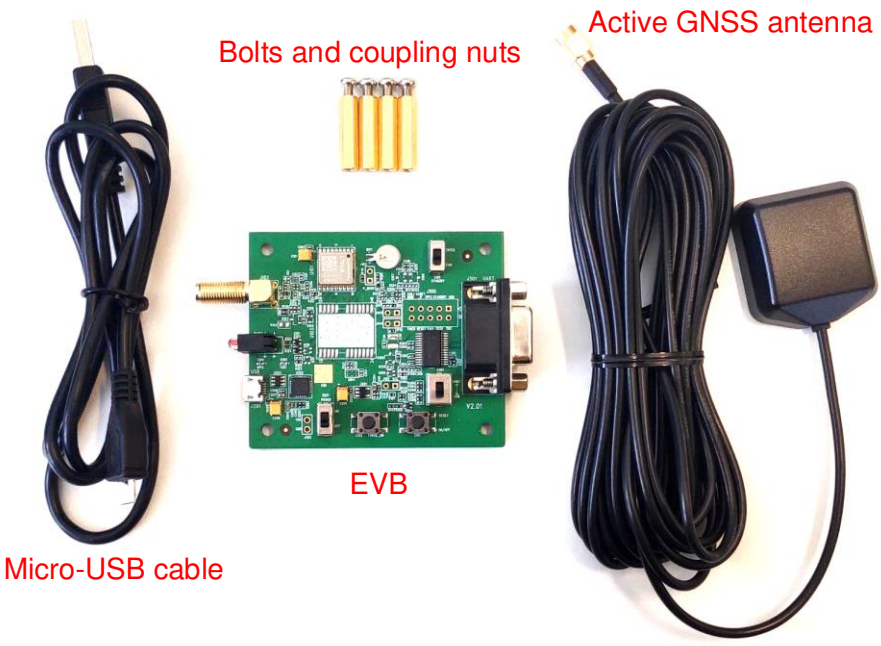


Figure 1: EVB Kit Accessories

Table 1: List of Accessories

Items	Description	Quantity
EVB	Evaluation Board Size: 60 mm × 70 mm	1
USB Cable	Micro-USB Cable	1
GNSS Antenna	Active GNSS Antenna Request the Antenna Datasheet from Quectel Technical Supports.	1
Instruction Sheet	A sheet that lists instructions: how to connect the EVB, details on EVB accessories, and much more.	1
Other	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 on how to connect the EVB and its accessories, refer to the instruction sheet inside 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 Board User Interfaces

3.1. EVB Top View

EVB top view is shown in the figure below.

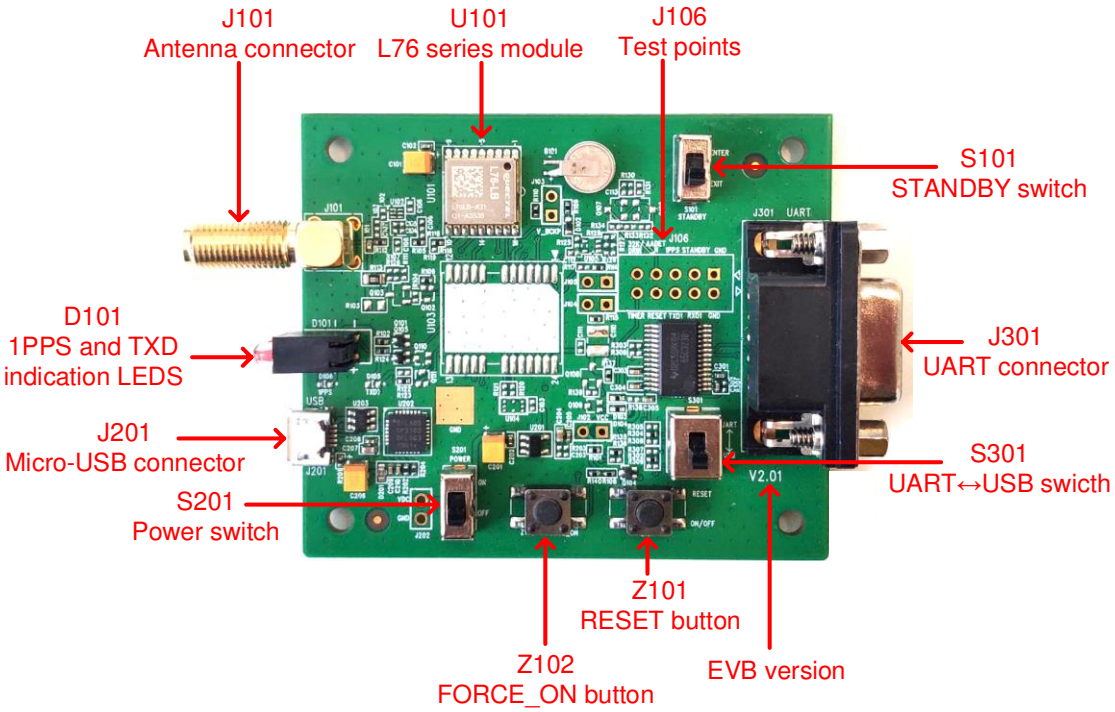


Figure 3: EVB Top View

3.2. Board User Interfaces

The EVB interfaces are detailed in the table below.

Table 2: Detailed EVB Interfaces

Function	Interfaces		Description
Power Supply	J201 Micro-USB		Power supply input: ● DC power supply: 4.5–5.5 V, typ. 5.0 V ● Current capability should be > 100 mA
User Interface	J201 Micro-USB		NMEA sentence output and command input
	J301 UART		NMEA sentence output and command input
RF Input	J101 Antenna Connector		The antenna in the kit supports: ● GPS L1 C/A ● GLONASS L1 ● BeiDou B1I ● QZSS L1 C/A ● SBAS L1
Signal Indication	D101 Indication LEDS	TXD (Blue LED)	Flash: Data output from UART TXD. Extinct or Bright: No data output from UART TXD.
		1PPS (Red LED)	Flash: Successful position fix. The frequency is 1 Hz. Extinct: No position fix.
Switches and Buttons	S201 Power Switch		Power the EVB on/off
	S101 STANDBY Switch (ENTER↔EXIT)		Switch to "**ENTER**", the module enters the standby mode. Switch to "**EXIT**", the module exits the standby mode.
	S301 UART↔USB Switch		Switch between USB data transfer and UART data transfer features.
	Z101 RESET Button		Short press the button to reset the module.
	Z102 FORCE_ON Button		Short press the button to wake up the module from the backup mode.
Test Points	J106 Test Points		Pins are detailed in ***Table 3*** below.

Test point distribution is shown below:

J106 Pin Assignment:

32K/DRIN	AADET_N	1PPS	STANDBY	GND
TIMER	RESET	TXD1	RXD1	GND

Table 3: J106 Pin Detailed Description

Pin Name	I/O	Description
32K/DRIN	-	NC
AADET_N	-	NC
1PPS	DO	1 pulse per second
STANDBY	DI	Enters or exits the standby mode
GND	-	Ground
TIMER	DO	An open drain output signal which controls the ON/OFF status of GNSS modules
RESET	DI	Resets the module
TXD	DO	Transmits data
RXD	DI	Receives the data
GND	-	Ground

4 Using QCOM Tool to Communicate

This chapter illustrates how to use the QCOM tool to communicate with the module via the Micro-USB interface.

Download the QCOM tool from our website Download Zone.

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: Set the power switch (S201) to **ON** position to power on the EVB and switch S301 to **USB** position.

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

Step 4: View the USB port numbers 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.

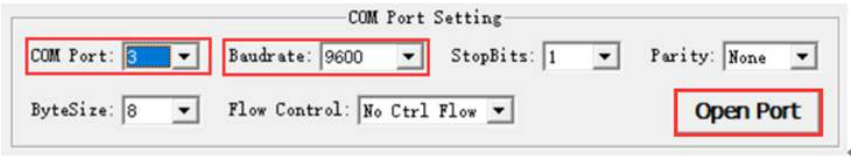


Figure 5: COM Port Setting Interface of QCOM

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**" as shown in ***Figure 5*** above, then the communication with EVB is established successfully. In this case, the NMEA sentences output by the module will be displayed through the QCOM tool, as shown in ***Figure 6*** below. For more information about QCOM usage, see ***document [1]***.

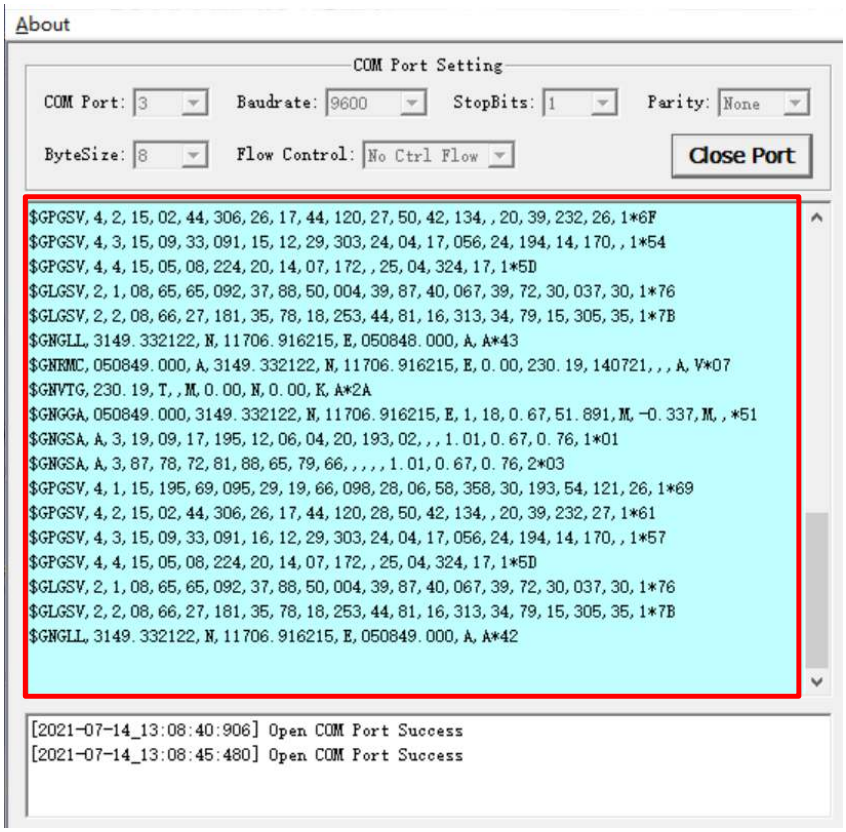


Figure 6: NMEA Sentences Output by Module – Displayed on QCOM Tool Interface

5 Using QGNSS Tool to Test

This chapter provides a brief explanation on the QGNSS software tool which can be used to verify the status of GNSS modules. For more information about QGNSS usage, see ***document [2]***.

Download the QGNSS tool from our website Download Zone.

5.1. COM Port and Baud Rate Setting

Step 1: Assemble the EVB Accessories.

Step 2: Set the power switch (S201) to **ON** position in order to power on the EVB and switch S301 to **USB** position.

Step 3: Start the QGNSS and click "**Setting**" and "**Serial Port Configuration**" (the L76 series supports 9600 bps by default), as shown in the figure below.

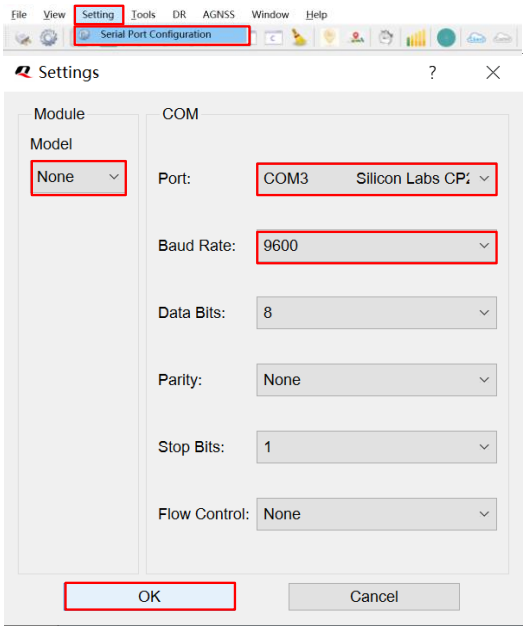


Figure 7: QGNSS Setting

Step 4: Click the **onnect or disconnect**" button. After connecting the module, the interface as shown in the figure below.

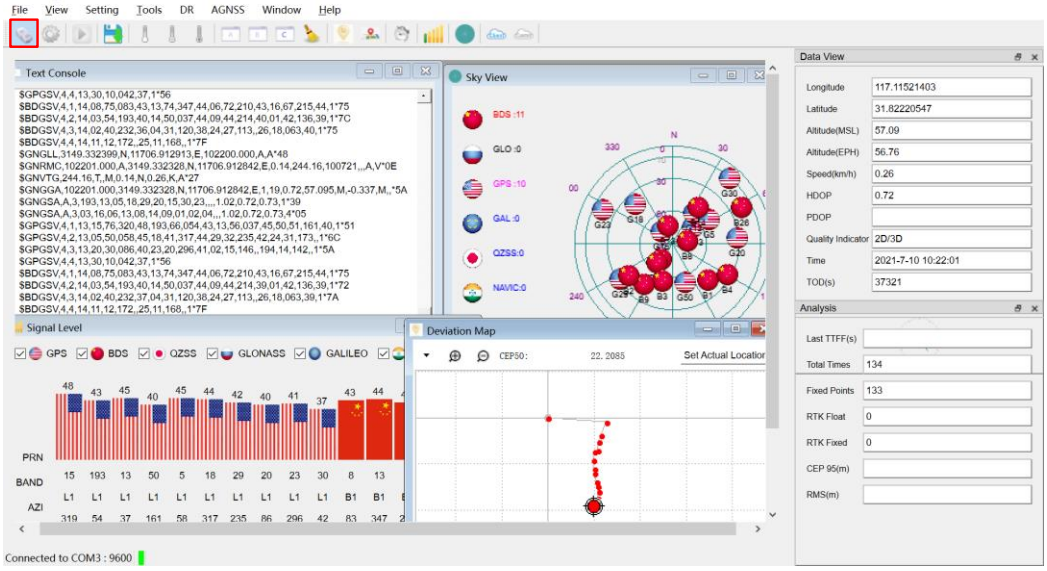
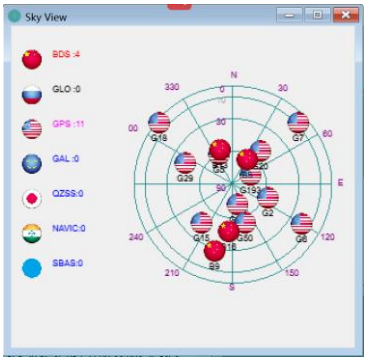


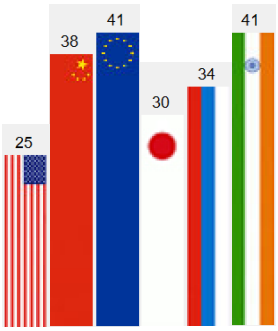
Figure 8: QGNSS Interface (Connected)

5.1.1. Interface Explanation

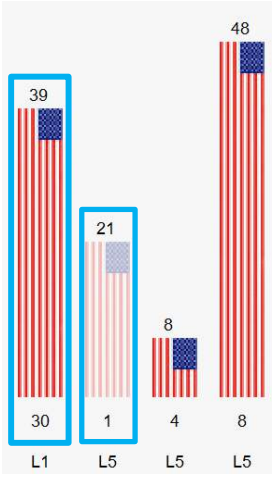
You can view GNSS information, such as CNR info, time, position, speed, and precision in the QGNSS interface. To find out more about these parameters, see the following table.

Table 4: Explanation of QGNSS Interface

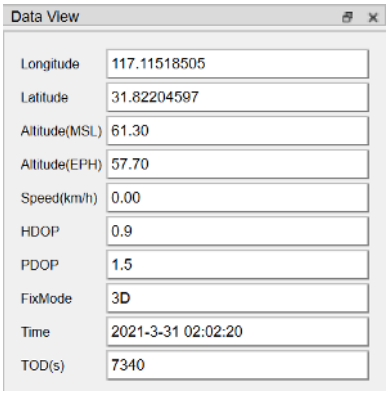
Icon	Explanation
	This sky view interface shows the satellite position of the satellites in use. The left column icons show the satellites in use and their numbers. ● BDS (BeiDou): 4 ● GLO (GLONASS): 0 ● GPS: 11 ● GAL (Galileo): 0 ● QZSS: 0 ● NavIC: 0 ● SBAS: 0 The grid map on the right shows the position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



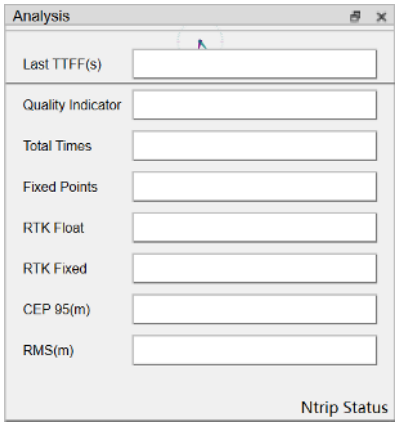
- GPS satellite
- BeiDou satellite
- GLONASS satellite
- Galileo satellite
- QZSS satellite
- NavIC satellite



- PRN 30 CNR is 39 dB/Hz.
- Column in bright red means that the navigation data of the satellite is in use.
- PRN 1 CNR is 21 dB/Hz.
- Column in light red means that the navigation data of this satellite is 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)

5.2. TTFF Testing

The QGNSS tool allows you to execute TTFF (Time to First Fix) testing under the following testing conditions:

- Full cold start
- Cold start
- Warm start
- Hot start

QGNSS configuration steps for TTFF testing:

Step 1: Click the "**Tools**" menu, and select the "**Static TTFF Testing**" as shown in the figure below.

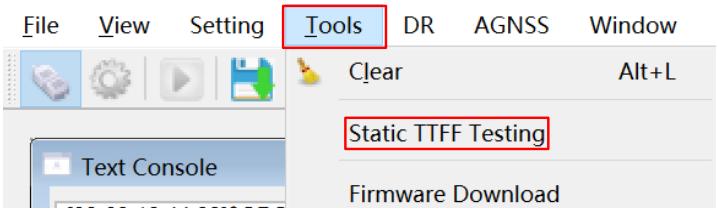


Figure 9: Static TTFF Testing via QGNSS

Step 2: Select "**Restart type**", set the "**Number of tests**" and "**TTFF Time-out (Sec)**", as shown in the figure below.

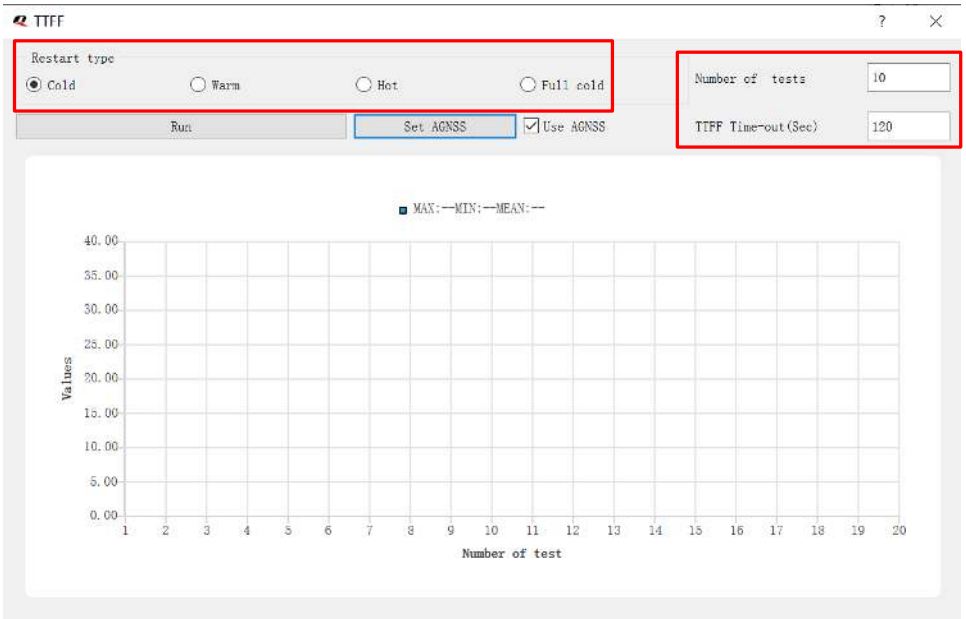


Figure 10: TTFF Test Settings

Step 3: AGNSS is optional when testing TTFF with QGNSS [1], as shown in the figure below. Click "**Set AGNSS**" button to set up online AGNSS. For more information, see ***Chapter 5.3.1***.

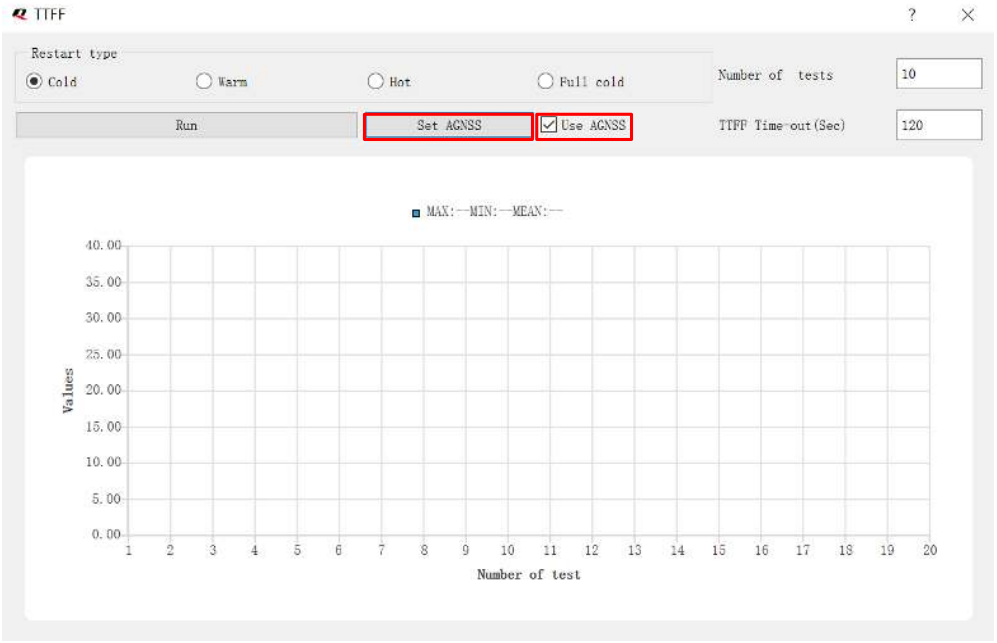


Figure 11: AGNSS Setting

Step 4: Click on the "**Run**" button to start the test. **OR**
Click on the "**Stop**" button to stop the test.

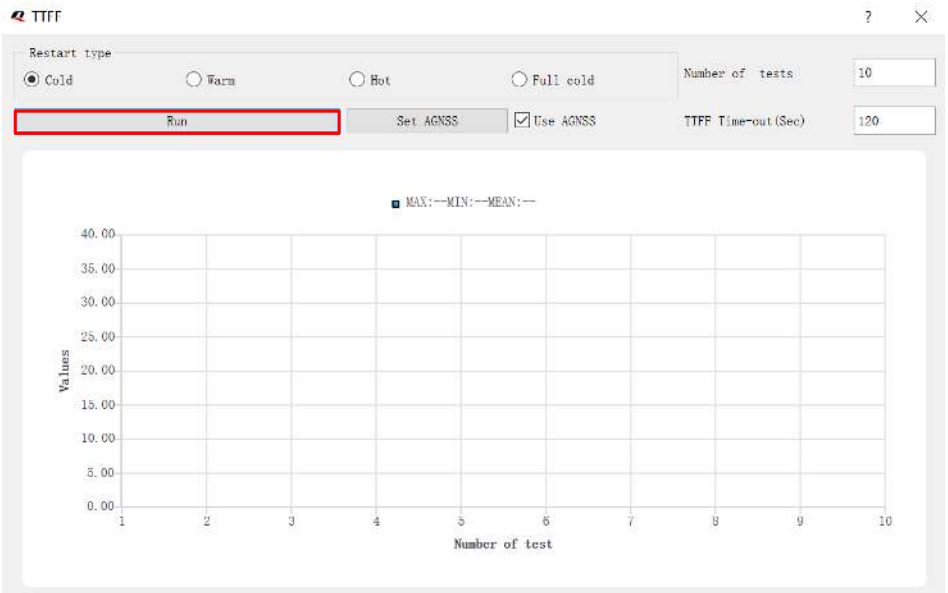


Figure 12: Run or Stop Test

[1] You can set AGNSS either in this step, or before the TTFF setting through the ways illustrated in ***Chapter 5.3***.

Step 5: View the test results displayed visually in charts as shown in the figure below. The test results are stored in the directory where the tool is installed.

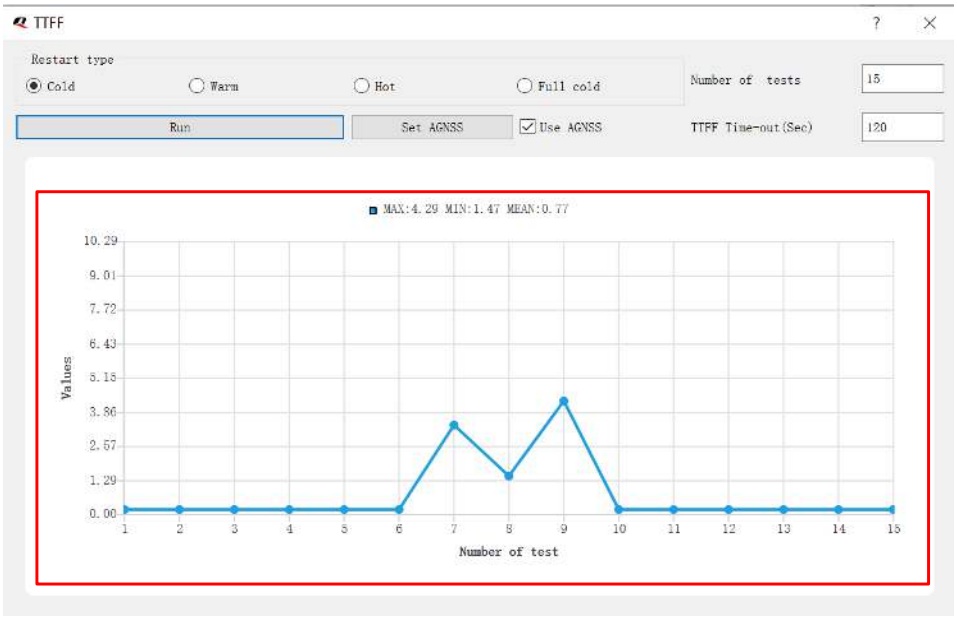


Figure 13: Test Results

5.3. AGNSS Setting

There are two ways to use AGNSS to improve the TTFF.

5.3.1. Assistant GNSS Online

Step 1: Click the "**AGNSS**" menu, and select the "**Assistant GNSS Online**" as shown in the figure below.

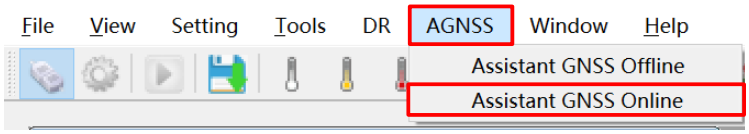


Figure 14: AGNSS Setting via QGNSS – Assistant GNSS Online

Step 2: In the "**Assistant GNSS Online**" interface, fill in the FTP server information, and set "**Time**", "**Position**" and "**Restart type**" according to your needs.

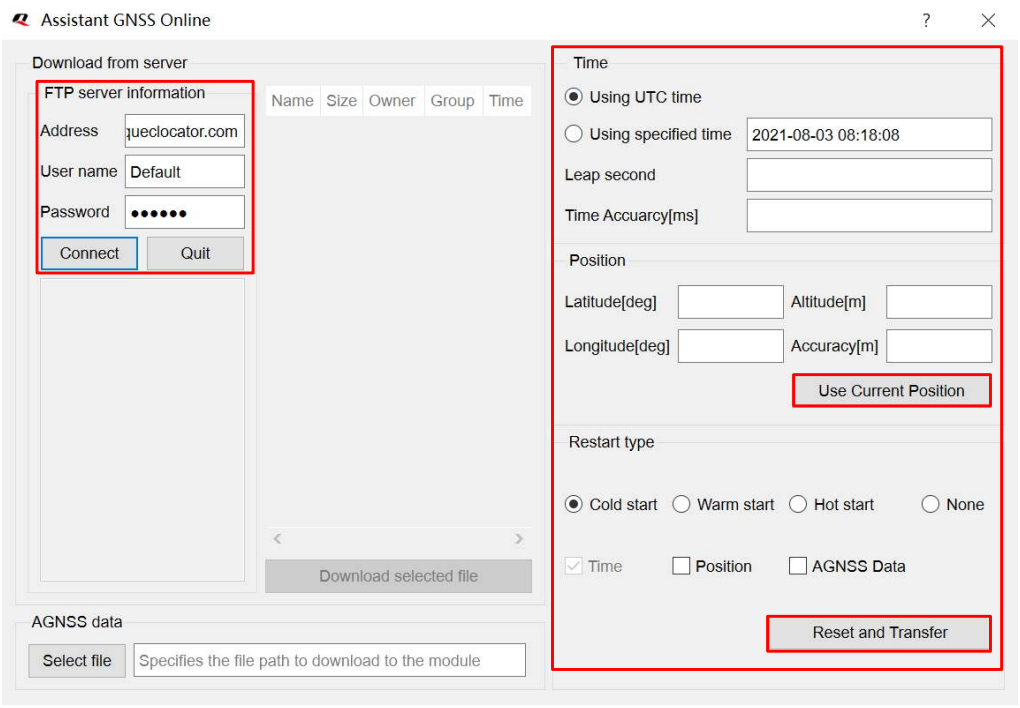


Figure 15: Assistant GNSS Online Setting

Step 3: After clicking the "**Connect**" button, select online AGNSS files according to your needs and then click "**Download selected file**" to download the files from the server.

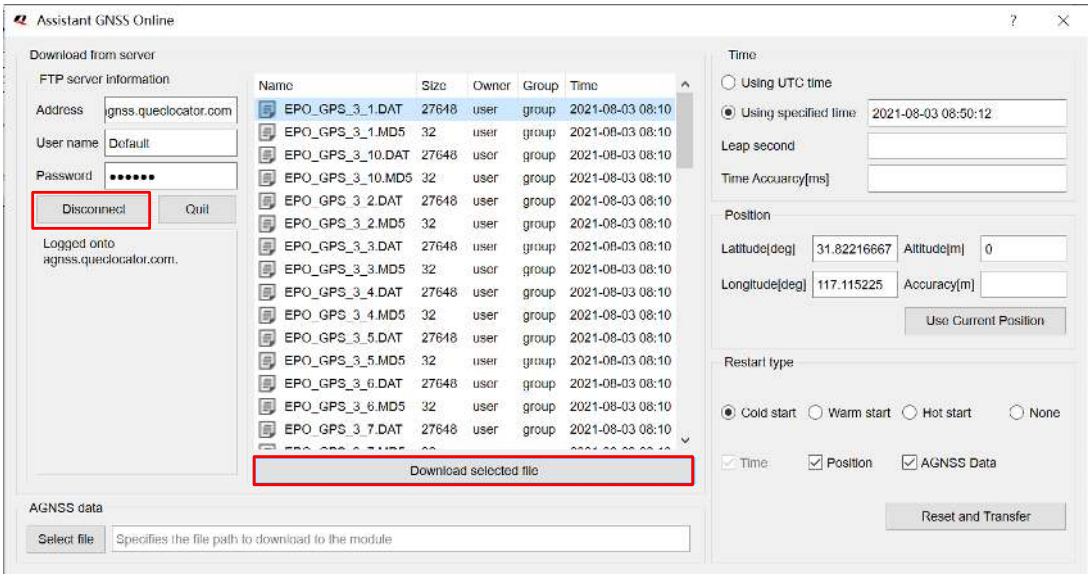


Figure 16: Connect and Download – AGNSS Online

Step 4: Click the "**Select file**" button to select the files to be downloaded to the module, and then click the "**Reset and Transfer**" button to start downloading, as shown in the figure below.

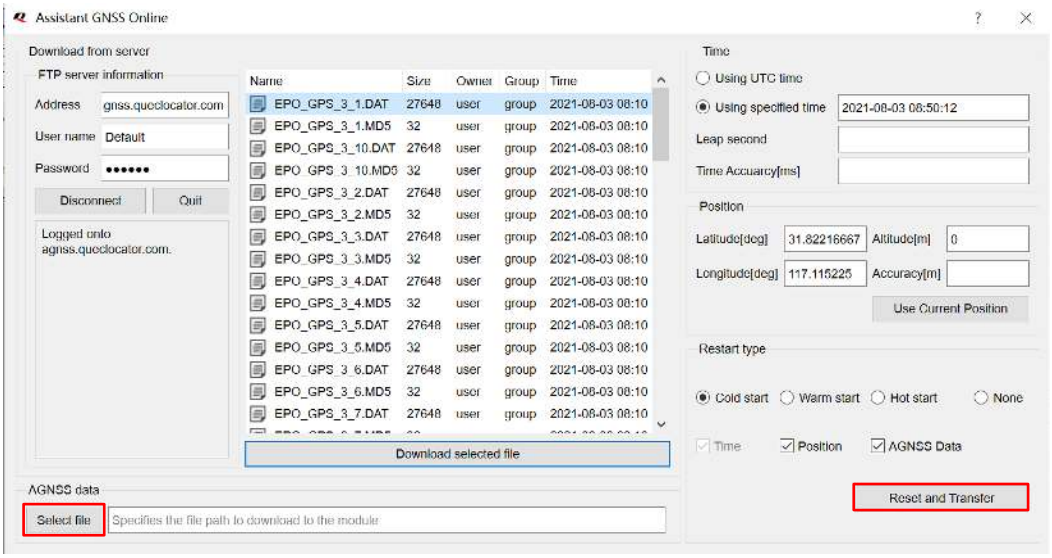


Figure 17: Download Selected File – AGNSS Online

Step 5: When the download is successful, the progress bar will indicate 100 % and there will be a green rectangle on the screen, as shown in the figure below.

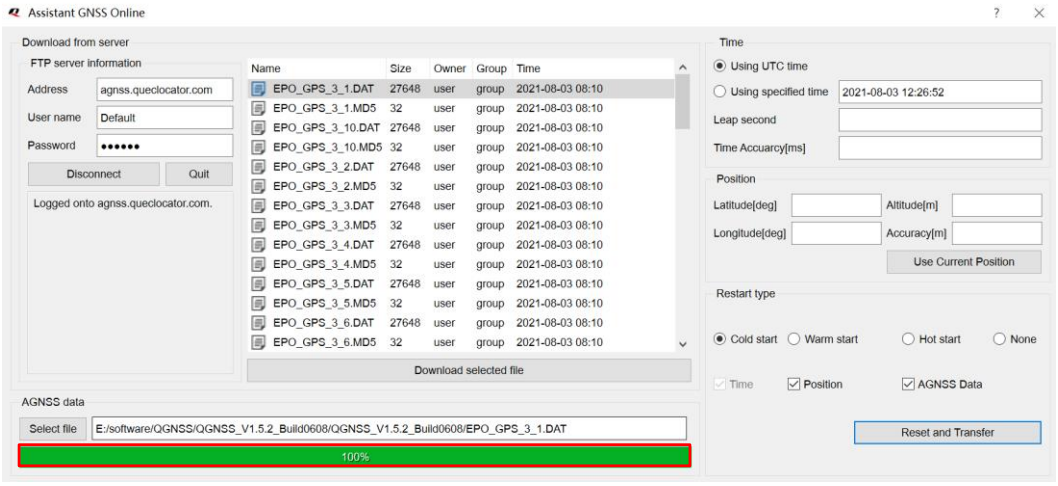


Figure 18: Successfully Downloaded to the Module – AGNSS Online

5.3.2. Assistant GNSS Offline

Step 1: Click the "**AGNSS**" menu, and select the "**Assistant GNSS Offline**" as shown in the figure below.

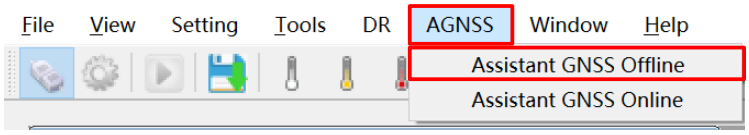


Figure 19: AGNSS Setting via QGNSS - Assistant GNSS Offline

Step 2: In the "**Assistant GNSS Offline**" interface, fill in the FTP server information, and set "**Time**", "**Position**" and "**Restart type**" according to your needs.

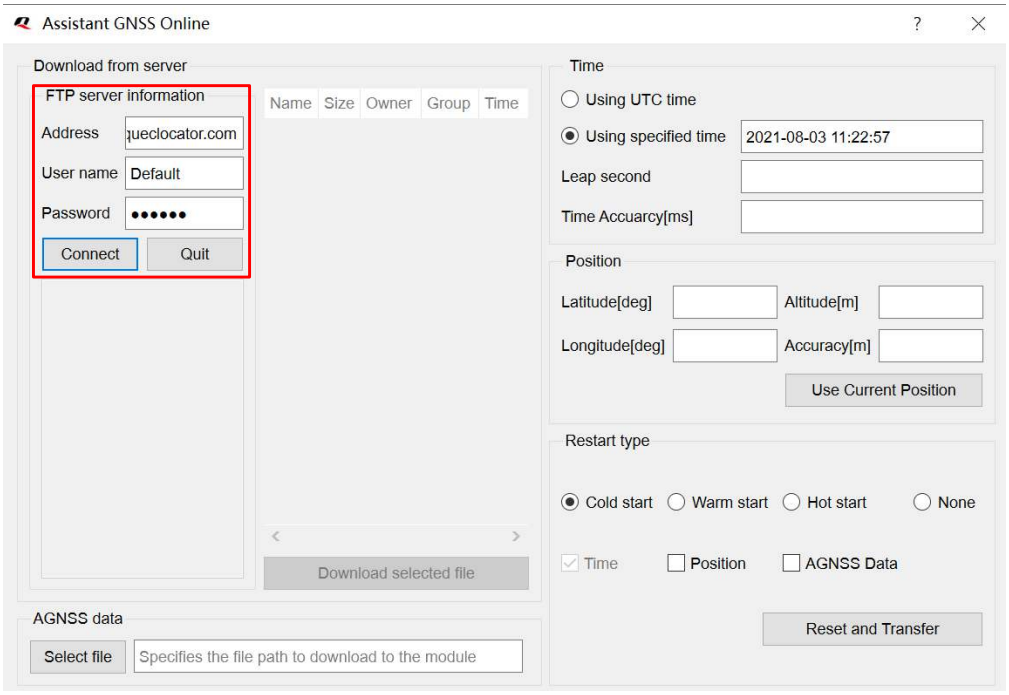


Figure 20: Assistant GNSS Offline Setting

Step 3: After clicking the "**Connect**" button, select the offline AGNSS files according to your needs and then click "**Download selected file**" to download the files from the server.

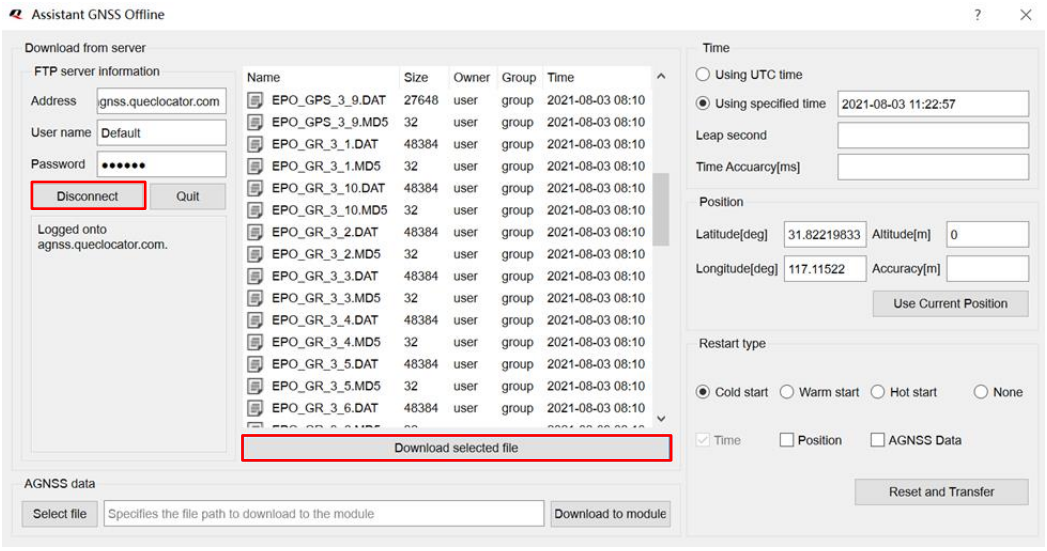


Figure 21: Connect and Download – AGNSS Offline

Step 4: Click the "**Select file**" button to select the files to be downloaded to the module, and then click the "**Download to module**" button to start downloading, as shown in the figure below.

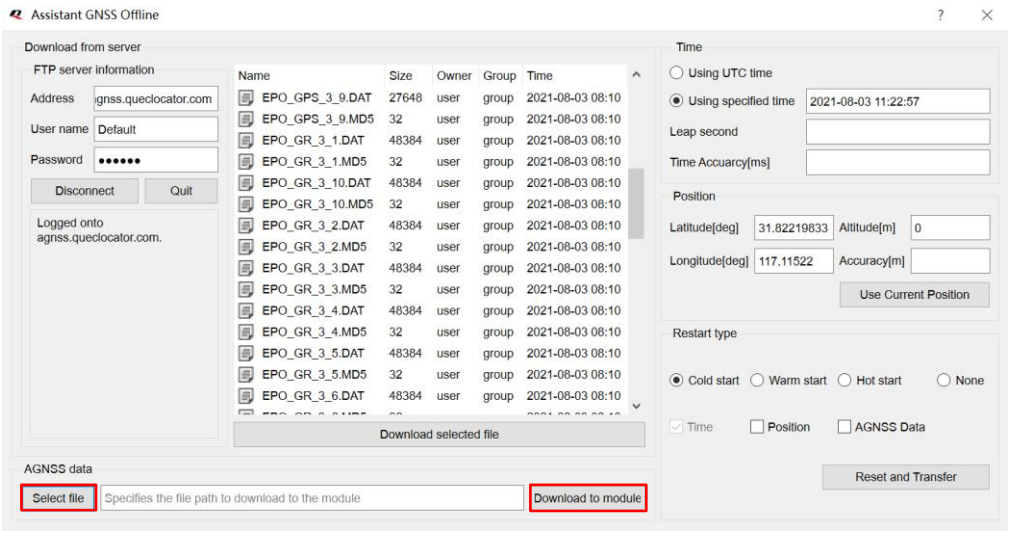


Figure 22: Download Selected File – AGNSS Offline

Step 5: When the download is successful, the progress bar will indicate 100 % and there will be a green rectangle on the screen, as shown in the figure below.

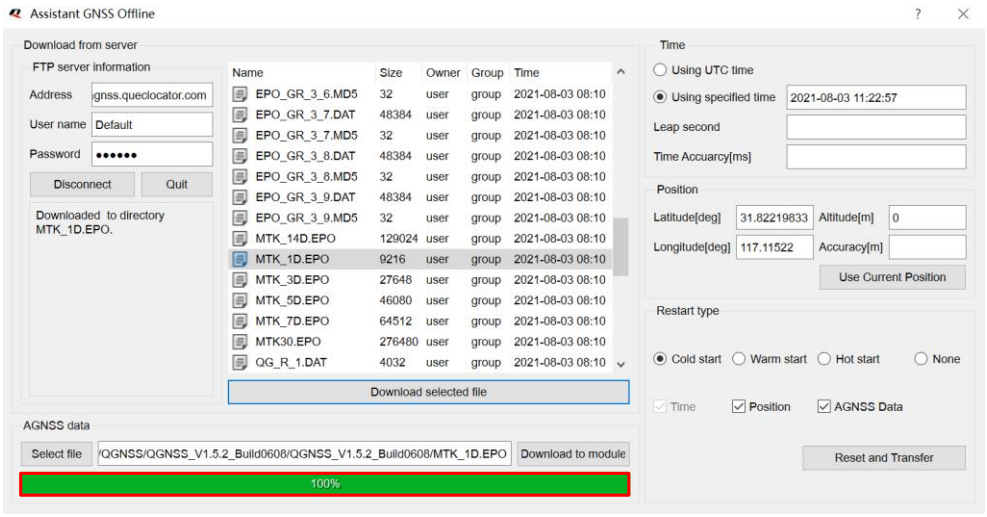


Figure 23: Successfully Downloaded to the Module – AGNSS Offline

6 Using QGPSFlashTool to Upgrade Firmware

Quectel L76 series module supports firmware upgrade via UART interface by using the QGPSFlashTool.

Download the QGPSFlashTool from our website Download Zone.

Before you start the firmware upgrade process:

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

Second: Set the power switch (S201) to **ON** position to power on the EVB and switch S301 to **USB**.

Firmware upgrade steps:

Step 1: Open QGPSFlashTool. Click "**Config**", then select "**Options**" as shown in the figure below.

Figure 24: Firmware Upgrade – Step 1

Step 2: In the Options popup, set the number of channels to be used. In the "**Tool Options**" drop-down list, select "**L76**" [2], then click "**OK**" as shown in the figure below.

[2] Select "**L76**" for all L76 series modules including L76, L76-L and L76-LB.

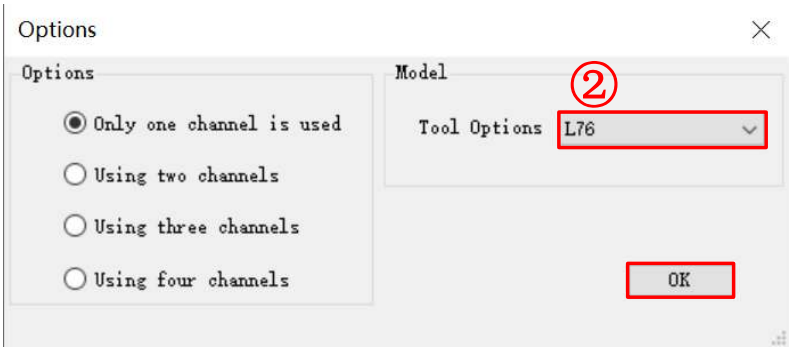


Figure 25: Firmware Upgrade – Step 2

Step 3: Double click the "**ROM file**" field to select the ROM file, e.g. "**L76LBNR03A01SCV03_GLN.bin**", then double click the "**DA File**" field to select the DA file, e.g. "**MTK_AllInOne_DA_MT3333_MP.bin**", as shown in the figure below.

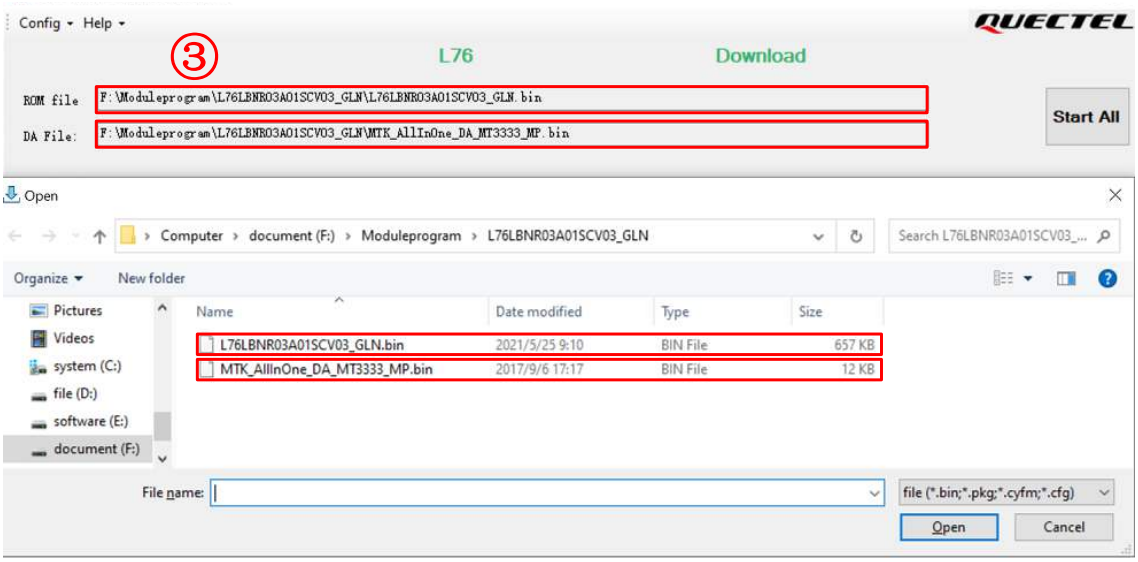


Figure 26: Firmware Upgrade – Step 3

Step 4: Confirm the "**Serial Port**" and "**Baudrate**", and then then click "**Start**" to download, as shown in the figure below.

The setting of the baud rate will affect the download speed. Based on **Step 2**, the baud rate will be automatically selected.

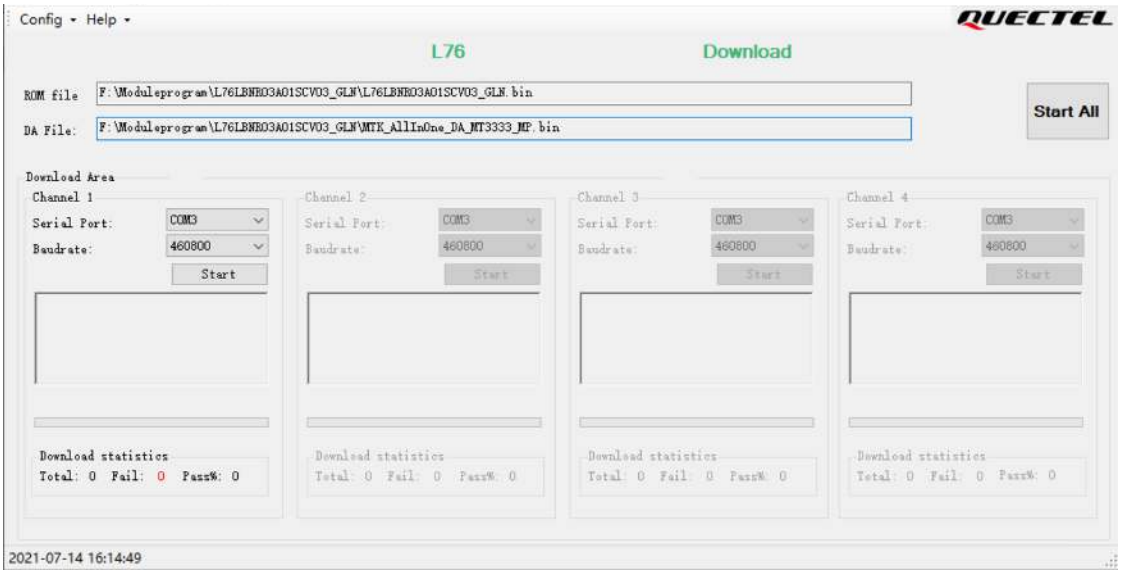


Figure 27: Firmware Upgrade – Step 4

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

Figure 28: Successful Firmware Upgrade

NOTE

Make sure the module is in continuous mode before firmware upgrading.

7 Appendix References

Table 5: Related Documents

Document Name
[1] Quectel_QCOM_User_Guide
[2] Quectel_QGNSS_User_Guide
[3] Quectel_QGPSFlashTool_User_Guide
[4] Quectel_L76-L(L)&L76-LB(L)_EVB_User_Guide

Table 6: Terms and Abbreviations

Abbreviation	Description
2D	2 Dimension
3D	3 Dimension
BeiDou	BeiDou Navigation Satellite System
COM Port	Communication Port
CEP	Circular Error Probable
CNR	Carrier-to-Noise Ratio
DI	Digital Input
DO	Digital Output
EPH	Ellipsoidal Height
ESD	Electrostatic Discharge
EVB	Evaluation Board
GND	Ground

GNSS	Global Navigation Satellite System
GPS	Global Positioning System
I/O	Input/Output
LED	Light Emitting Diode
LNA	Low-Noise Amplifier
Micro-USB	Micro Universal Serial Bus
MSL	Mean Sea Level
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard
PC	Personal Computer
PI	Power Input
PMTK	MTK Proprietary Protocol
PO	Power Output
PPS	Pulse Per Second
PRN	Pseudorandom Noise
RMS	Root Mean Square
RTK	Real-Time Kinematic
RXD	Receive Data (Pin)
SBAS	Satellite-Based Augmentation System
SPS	Standard Positioning Service
SV	Satellite Vehicle
TTFF	Time to First Fix
TXD	Transmit Data (Pin)
USB	Universal Serial Bus
UTC	Coordinated Universal Time
WGS84	World Geodetic System 1984