

LG69T (AI,AJ)

EVB User Guide

GNSS Module Series

Version: 1.1

Date: 2022-06-20

Status: Released



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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 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 | LG69T (AI,AJ) EVB User Guide |
| Subtitle | GNSS Module Series |
| Document Type | EVB User Guide |
| Document Status | Released |

Revision History

| Version | Date | Description |
|---------|------------|--|
| - | 2022-02-28 | Creation of the document |
| 1.0 | 2022-06-15 | First official release |
| 1.1 | 2022-06-20 | <ol style="list-style-type: none"> 1. Added the Type-B USB cable (Chapter 2 and 3). 2. Added the information on J101 interface (Figure 3). 3. Updated the EVB power supply interface from J201 to J101 (Table 3). |

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..... | 9 |
| 2.2. Connect Cables and Antenna to EVB..... | 10 |
| 3 EVB User Interfaces..... | 11 |
| 3.1. EVB Top View..... | 11 |
| 3.2. EVB Interfaces..... | 12 |
| 4 Communication via QCOM Tool..... | 14 |
| 4.1. Communication via Micro-USB Interface..... | 14 |
| 5 Test via QGNSS Tool..... | 16 |
| 5.1. QGNSS Setting..... | 16 |
| 5.1.1. QGNSS Interface Explanation..... | 17 |
| 6 Firmware Download and Upgrade via GNSSFlashTool..... | 20 |
| 6.1. Firmware Download in Boot Download Mode..... | 20 |
| 6.2. Firmware Upgrade in Normal Operating Mode..... | 22 |
| 7 Appendix Reference..... | 25 |

Table Index

| | |
|--|----|
| Table 1: List of Kit Components | 9 |
| Table 2: Detailed EVB Interfaces | 12 |
| Table 3: J302 Pin Assignment: | 13 |
| Table 4: J302 Pin Detailed Description | 13 |
| Table 5: QGNSS Interface Explanation..... | 17 |
| Table 6: Related Document..... | 25 |
| Table 7: Terms and Abbreviations | 25 |

Figure Index

| | |
|---|----|
| Figure 1: EVB and Components | 9 |
| Figure 2: EVB and Components Assembly..... | 10 |
| Figure 3: EVB Top View | 11 |
| Figure 4: USB Ports | 14 |
| Figure 5: COM Port Setting Interface of QCOM | 14 |
| Figure 6: RTCM Message Output – Displayed on QCOM Tool Interface..... | 15 |
| Figure 7: COM Port Setting Interface of QGNSS | 16 |
| Figure 8: QGNSS Interface (Connected)..... | 17 |
| Figure 9: Firmware Download – Step 1 | 20 |
| Figure 10: Firmware Download – Step 2 | 21 |
| Figure 11: Firmware Download – Step 3 | 21 |
| Figure 12: Firmware Download – Step 4 | 21 |
| Figure 13: Successful Firmware Download – Step 5..... | 22 |
| Figure 14: Firmware Upgrade – Step 1..... | 22 |
| Figure 15: Firmware Upgrade – Step 2..... | 23 |
| Figure 16: Firmware Upgrade – Step 3..... | 23 |
| Figure 17: Firmware Upgrade – Step 4..... | 23 |
| Figure 18: Successful Firmware Upgrade – Step 5..... | 24 |

1 Introduction

This document provides information on the steps needed to evaluate the Quectel LG69T(AI) and LG69T (AJ) using the Evaluation Board (EVB). The EVB is a convenient tool that allows you to become familiar with the LG69T (AI) and LG69T (AJ).

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 modules via the QCOM tool;
- Chapter 5 describes how to test the modules via QGNSS tool;
- Chapter 6 describes how to download and upgrade the module firmware via the GNSSFlashTool;
- 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 Support (support@quectel.com).

2 General Overview

2.1. EVB Kit

The EVB Kit includes: Evaluation Board (EVB), Quectel Active GNSS Antenna, Micro-USB Cable, Type-B USB Cable, Bolts and Coupling Nuts. Download the software tools (QCOM, QGNSS and 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.

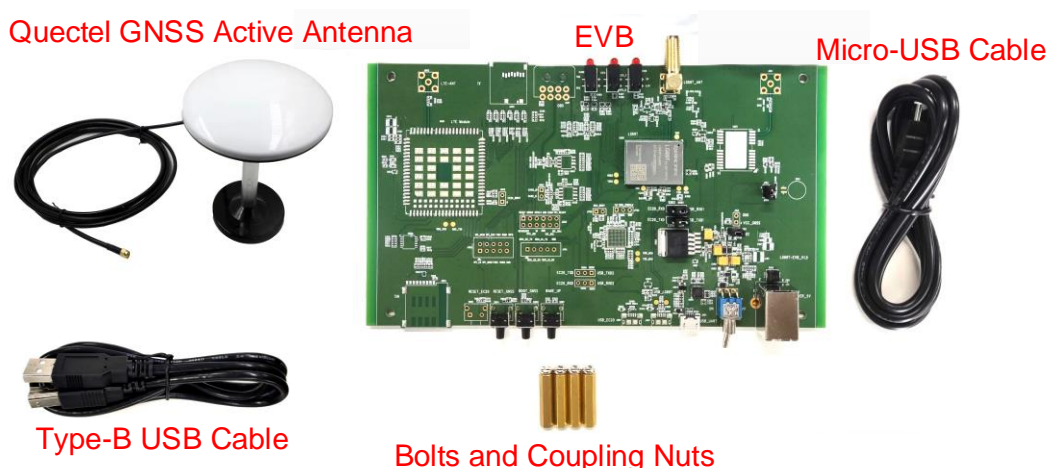


Figure 1: EVB and Components

Table 1: List of Kit Components

| Items | Description | Quantity |
|--------------|---|----------|
| EVB | Evaluation Board Size: 100 mm x 175 mm | 1 |
| USB Cable | Micro-USB Cable | 1 |
| | Type-B USB Cable | 1 |
| GNSS Antenna | Quectel Active GNSS Antenna: YEGM011BA Request the Antenna Datasheet from Quectel Technical | 1 |

| | | |
|-------------------|---|---------|
| | Support. | |
| 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.

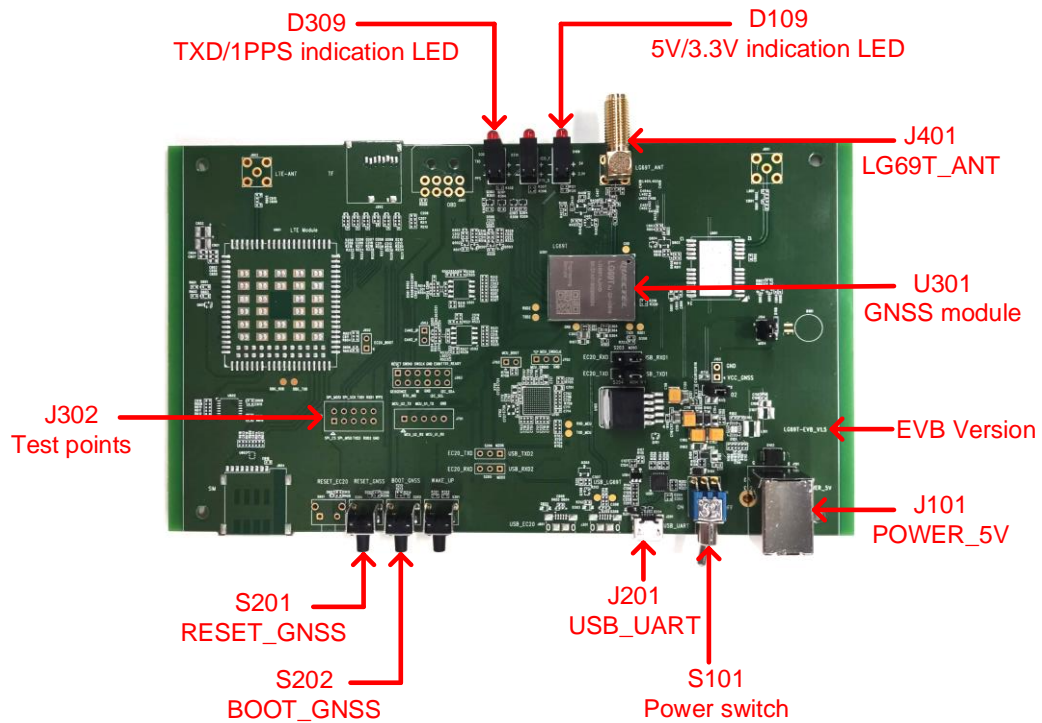


Figure 3: EVB Top View

3.2. EVB Interfaces

The EVB interfaces are detailed in the table below.

Table 2: Detailed EVB Interfaces

| Function | Interfaces | | Description |
|-------------------------|-------------------------------------|--------------------|---|
| Power Supply | J101 POWER_5V | | 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 > 2 A |
| Communication Interface | J201 USB_UART | | <p>Enhanced COM Port: Used for configuring the modules, RTCM message output and firmware upgrade.</p> <p>Standard COM Port: No message input/output, reserved for future use.</p> |
| RF Input | J401 LG69T_ANT Connector | | <p>The antenna in the Kit supports:</p> <ul style="list-style-type: none"> ● GPS L1 C/A, L2¹ and L5 ● GLONASS¹ L1 and L2 ● Galileo E1, E5b¹ and E5a ● BDS B1I, B2I¹ and B2a ● QZSS L1 C/A, L2¹ and L5 |
| Signal Indication | D309 TXD/1PPS Indication LED | 1PPS (Red LED) | Flash: Outputs pulse signal of 1 Hz. Extinct: 1PPS is unavailable. |
| | | TXD (Green LED) | Flash: Message output from UART1 TXD. Extinct/Bright: No message output from UART1 TXD. |
| | D109 5 V/3.3 V Indication LED | 3.3 V (Red LED) | EVB 3.3 V power indicator. |
| | | 5 V (Green LED) | EVB 5 V power indicator. |
| Switch and Buttons | S101 Power Switch | | Power the EVB on/off. |
| | S201 RESET_GNSS | | Short press the button to reset the modules. |
| | S202 BOOT_GNSS | | Press and hold the button first and then flip the power switch to ON position to make the modules enter Boot download mode. |

¹ The GPS L2, GLONASS L1, GLONASS L2, Galileo E5b, BDS B2I and QZSS L2 bands are only supported by LG69T (AI) module.

| | | |
|-------------|---------------------|---|
| Test Points | J302 Test Points | Pins are detailed in Table 3 and Table 4 below. |
|-------------|---------------------|---|

Test point distribution is shown below:

Table 3: J302 Pin Assignment:

| | | | | |
|----------|----------|------|------|------|
| SPI_MOSI | SPI_SCK | TXD1 | RXD1 | 1PPS |
| SPI_CS | SPI_MISO | TXD2 | RXD2 | GND |

Table 4: J302 Pin Detailed Description

| Pin Name | I/O | Description |
|----------|-----|----------------------|
| SPI_MOSI | - | NC (Not connected) |
| SPI_SCK | - | NC |
| TXD1 | DO | TXD1 Transmit data |
| RXD1 | DI | RXD1 Receive data |
| 1PPS | DO | One pulse per second |
| SPI_CS | - | NC |
| SPI_MISO | - | NC |
| TXD2 | DO | TXD2 Transmit data |
| RXD2 | DO | RXD2 Receive data |
| GND | - | Ground |

4 Communication via QCOM Tool

This chapter explains how to use the QCOM tool to communicate with the modules 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 Micro-USB Interface

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: View the USB port numbers in the Device Manager, as shown in the figure below.

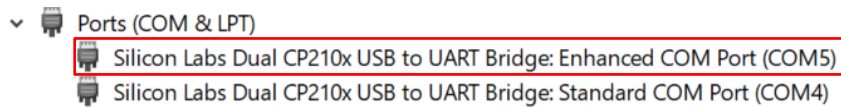


Figure 4: USB Ports

Step 4: Install the QCOM tool provided by Quectel. The COM interface for QCOM port setting is shown in the figure below (default baud rate: 460800 bps ²).

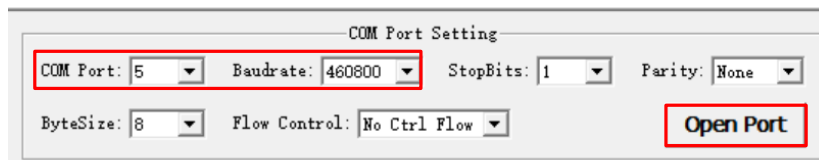


Figure 5: COM Port Setting Interface of QCOM

Step 5: Select the correct “**COM Port**” (USB Port shown in *Figure 4* above) and the “**Baudrate**”.

² UART interface default settings vary depending on software versions.

Step 6: Click “Open Port” to establish communication with the EVB, as shown in the *Figure 5*. The RTCM message output by the module will be displayed in the receiving bar of the QCOM tool, as shown in the *Figure 6*.

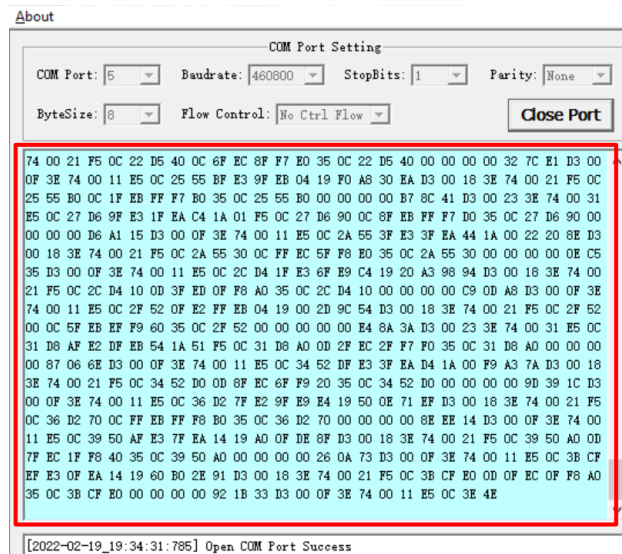


Figure 6: RTCM Message Output – Displayed on QCOM Tool Interface

5 Test via QGNSS Tool

This chapter explains how to use the QGNSS software tool for verifying the status of GNSS modules. You can request the QGNSS tool from Quectel Technical Support. For more information about QGNSS use, see *document [2]*.

5.1. QGNSS Setting

Step 1: Assemble the EVB components.

Step 2: Connect the EVB and the PC with a Micro-USB cable. 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”** (default baud rate: 460800 bps ³)

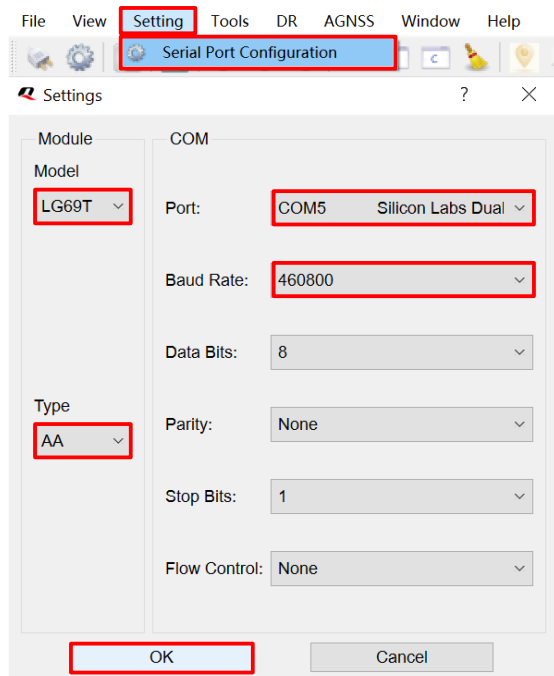



Figure 7: COM Port Setting Interface of QGNSS

³ UART interface default settings vary depending on software versions.

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

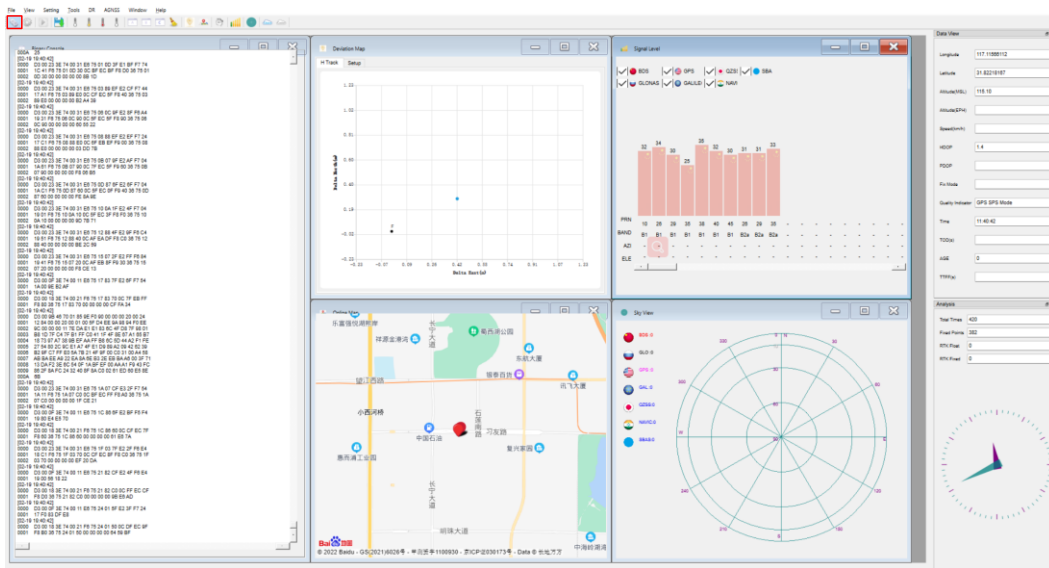
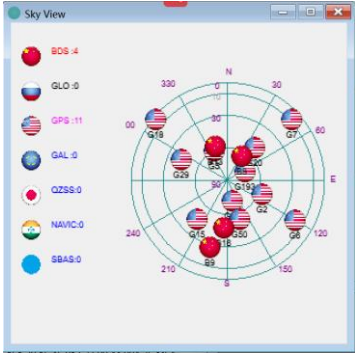


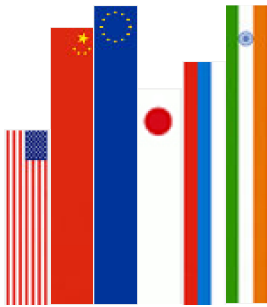
Figure 8: QGNSS Interface (Connected)




5.1.1. QGNSS Interface Explanation

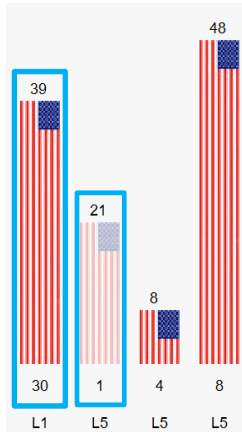
You can view GNSS information, such as C/N₀ message, time, position, speed, and precision in the QGNSS interface. See the following table to find out more about these parameters.

Table 5: QGNSS Interface Explanation

| Icon | Explanation |
|---|---|
|  | <p>The sky view interface shows the position of the satellites in use.</p> <ol style="list-style-type: none"> The left column icons shown 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 (IRNSS) 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 Dock

Longitude:

Latitude:

Altitude(MSL):

Altitude(EPH):

Speed(km/h):

HDOP:

PDOP:

Fix Mode:

Quality Indicator:

Time:

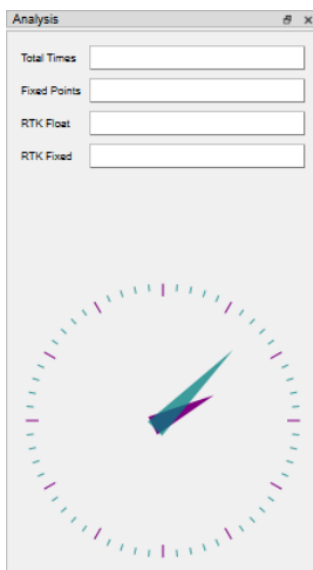
TOD(s):

AGE:

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
- Fixed Mode: 2D, 3D
- Quality Indicator: DGNSS, DGPS and GPS SPS mode
- UTC date and time
- Time of day ⁴ (unit: second)
- Age of differential GPS data
- Last TTFF(s) (unit: second)

⁴ Total number of seconds elapsed since midnight of the current day.



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

6 Firmware Download and Upgrade via GNSSFlashTool

The modules upgrade firmware with GNSSFlashTool via the UART interface. You can request the GNSSFlashTool from Quectel Technical Support. For more information about GNSSFlashTool use, see *document [3]*.

6.1. Firmware Download in Boot Download Mode

Before you start the module firmware download process:

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

Second: Flip the Power switch (S101) to **OFF** position before power on the EVB.

Firmware download steps in Boot download mode:

Step 1: Open GNSSFlashTool or click **“Tools”** and select **“Firmware Download”** in QGNSS tool.

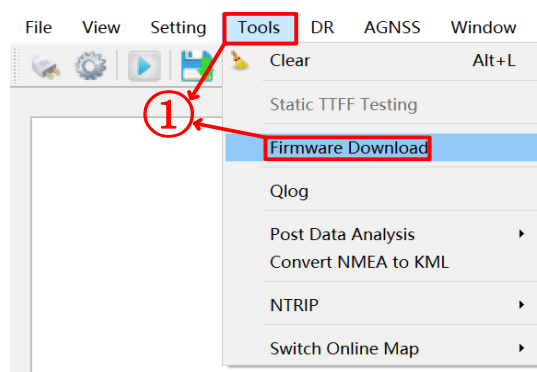


Figure 9: Firmware Download – Step 1

Step 2: Select **“LG69TAA_Download”** in the drop-down box of **“Tool Options”**.



Figure 10: Firmware Download – Step 2

Step 3: Click “Open File” to select module firmware, e.g., “LG69TAINR01A04V01_BOOT.bin” for LG69T (AI) module and “LG69TAJNR01A04V01_BOOT.bin” for LG69T (AJ) module.

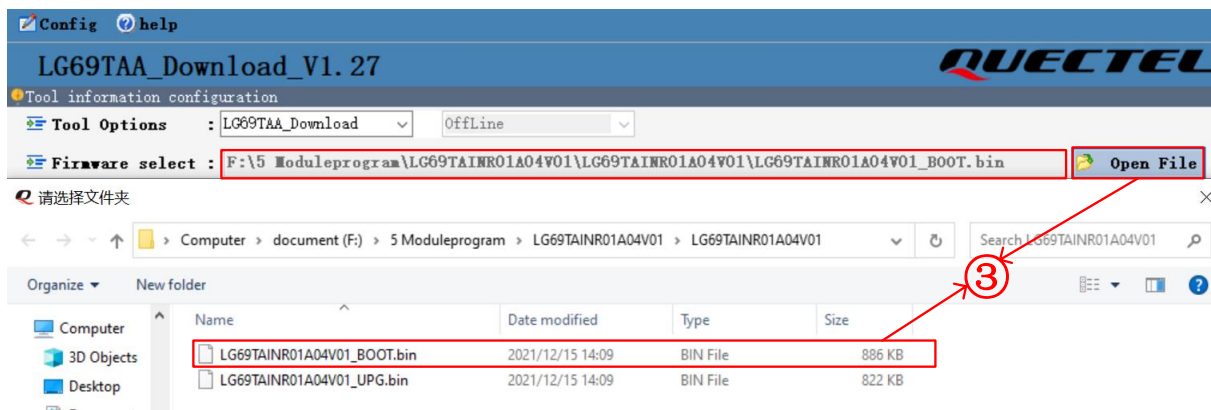


Figure 11: Firmware Download – Step 3

Step 4: Confirm the “Port” and “Baud Rate” as the enhanced COM Port and then click “Start” button. Press and hold the BOOT_GNSS button before flipping the power switch to **ON** position, and then release the BOOT_GNSS button to enter Boot download mode.

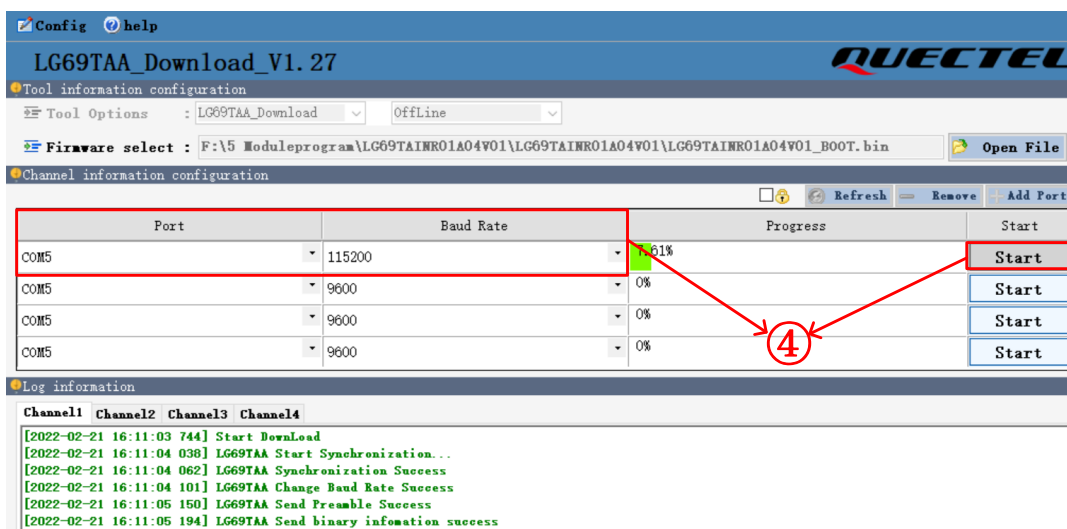


Figure 12: Firmware Download – Step 4

Step 5: Upon successful firmware download, the GNSSFlashTool green progress bar on the screen will indicate “PASS”.

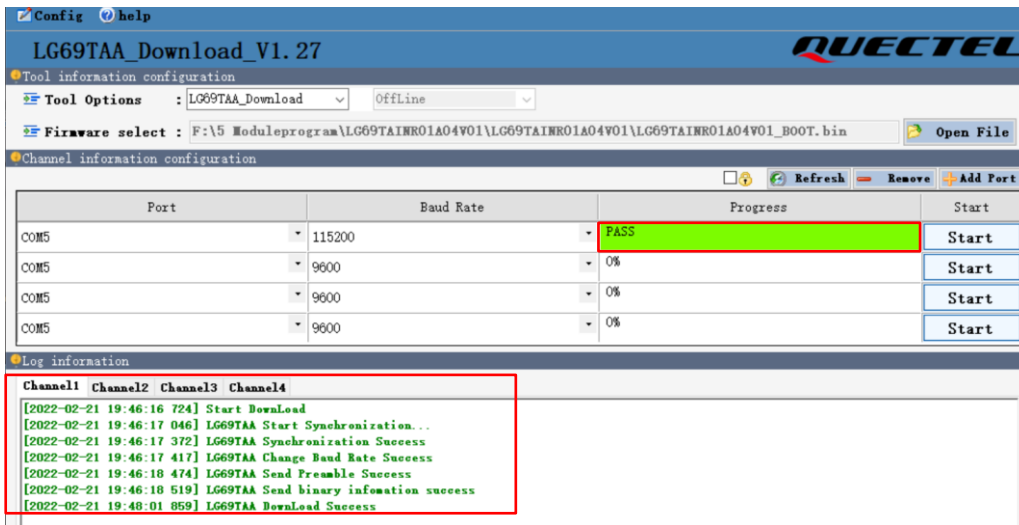


Figure 13: Successful Firmware Download – Step 5

6.2. Firmware Upgrade in Normal Operating Mode

Before you start the firmware upgrade process, connect the EVB to a PC with a Micro-USB cable.

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.

Step 1: Open GNSSFlashTool or click “**Tools**” and select “**Firmware Download**” in QGNSS tool.

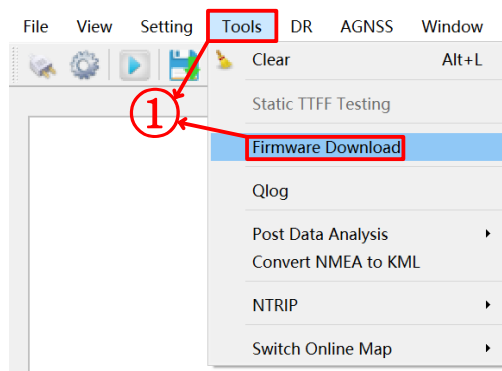


Figure 14: Firmware Upgrade – Step 1

Step 2: Select “LG69TAA_Upgrade” in the drop-down box of “Tool Options”.



Figure 15: Firmware Upgrade – Step 2

Step 3: Click “Open File” to select module firmware, e.g. “LG69TAINR01A04V01_UPG.bin” for LG69T (AI) module and “LG69TAJNR01A04V01_UPG.bin” for LG69T (AJ) module.

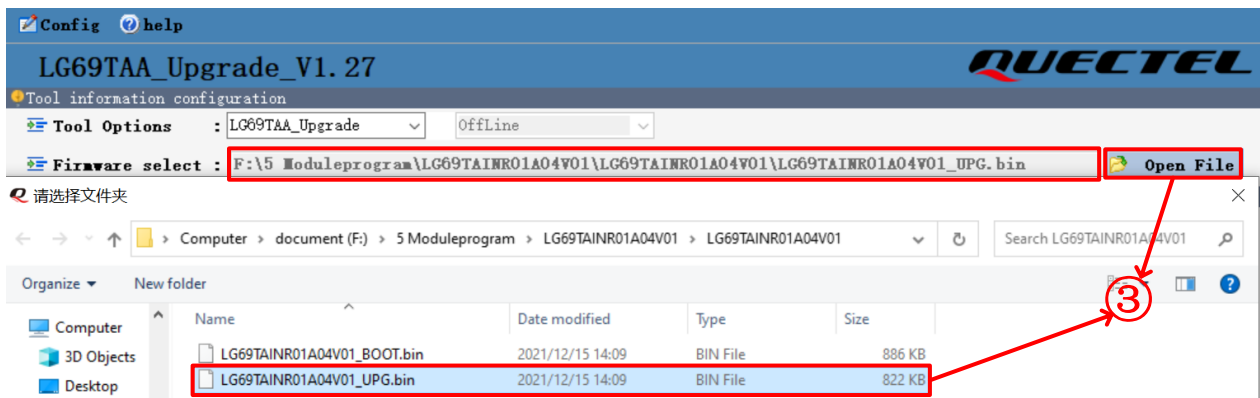


Figure 16: Firmware Upgrade – Step 3

Step 4: Confirm the “Port” and “Baud Rate” as the enhanced COM Port and then click “Start”. Press and release RESET_GNSS button on the EVB when the progress bar becomes 5.17 % and 98.28 %.

If the operation is not performed, the firmware download will fail.

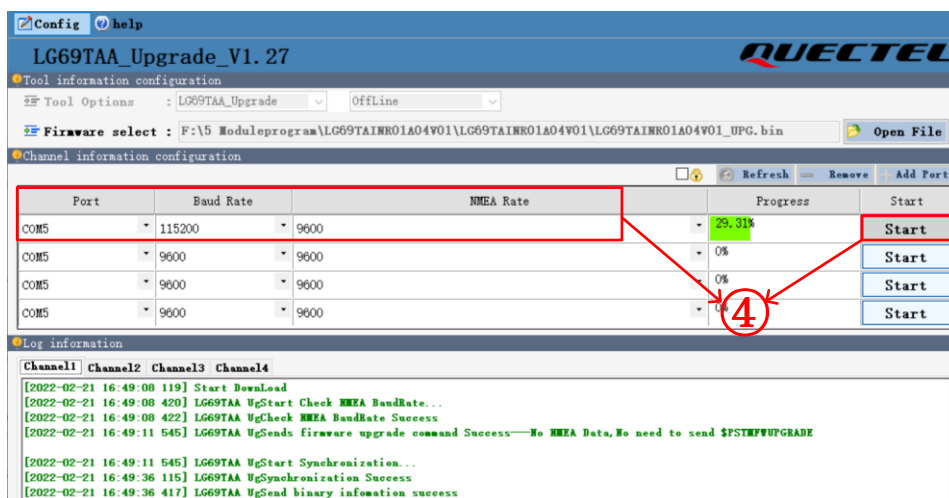


Figure 17: Firmware Upgrade – Step 4

Step 5: Upon successful firmware upgrade, the GNSSFlashTool green progress bar on the screen will indicate “PASS”.

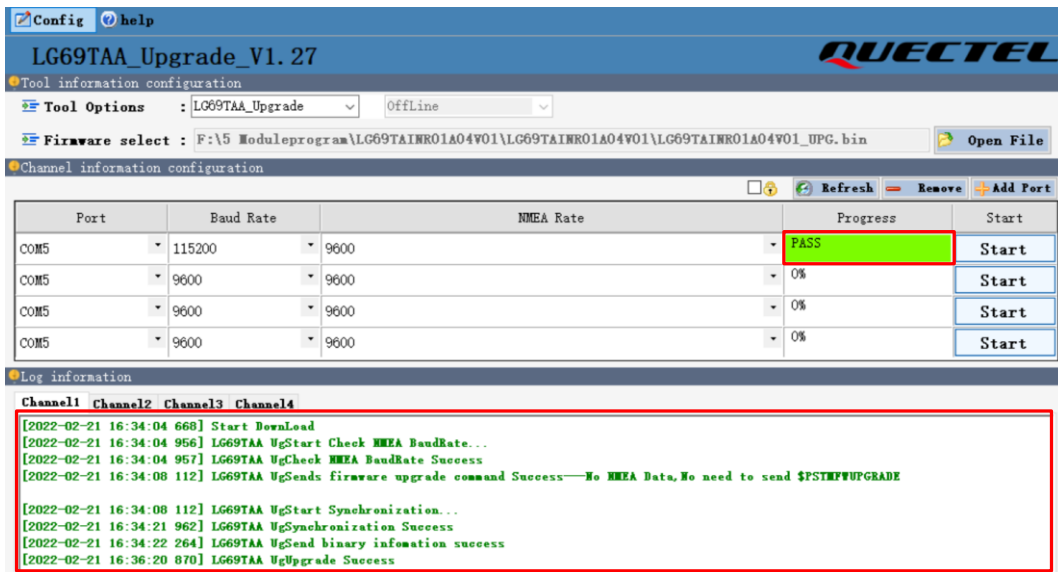


Figure 18: Successful Firmware Upgrade – Step 5

NOTE

Before firmware upgrade, ensure that the modules are in Continuous mode.

7 Appendix References

Table 6: Related Document

| Document Name |
|---|
| [1] Quectel_QCOM_User_Guide |
| [2] Quectel_QGNSS_User_Guide |
| [3] Quectel_GNSSFlashTool_User_Guide |

Table 7: Terms and Abbreviations

| Abbreviation | Description |
|------------------|---|
| 2D | 2 Dimension |
| 3D | 3 Dimension |
| BDS | BeiDou Navigation Satellite System |
| C/N ₀ | Carrier-to-Noise Ratio |
| CEP | Circular Error Probable |
| COM Port | Communication Port |
| 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 |
| I/O | Input/Output |
| IRNSS/NavIC | Indian Regional Navigation Satellite System |
| LED | Light Emitting Diode |
| MISO | Master In Slave Out |
| MOSI | Master Out Slave In |
| Micro-USB | Micro Universal Serial Bus |
| MSL | Mean Sea Level |
| PC | Personal Computer |
| PCB | Printed Circuit Board |
| 1PPS | One Pulse Per Second |
| PRN | Pseudorandom Noise |
| QZSS | Quasi-Zenith Satellite System |
| RF | Radio Frequency |
| RTCM | Radio Technical Commission for Maritime services |
| RTK | Real-Time Kinematic |
| RXD | Receive Data (Pin) |
| SBAS | Satellite-Based Augmentation System |
| SPS | Standard Positioning Service |
| TTFF | Time to First Fix |
| TXD | Transmit Data (Pin) |
| UART | Universal Asynchronous Receiver & Transmitter |
| USB | Universal Serial Bus |

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