

L80&L80-R&L86&LC86L EVB User Guide

GNSS Module Series

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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 cellular terminal or mobile incorporating L80, L80-R, L86, LC86L modules. Manufacturers of the cellular 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 safety 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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Revision History

Version	Date	Description
1.0	2014-08-18	Initial
2.0	2020-12-22	<ol style="list-style-type: none"> 1. Incorporated the information of L80, L80-R and L86 EVB user guides (created separately years ago) into this manual. 2. Added the applicable module LC86L.
2.1	2021-11-24	Updated the overall structure of the document, including but not limited to the adding of Chapters 4, 5 and 6.

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1 Introduction

This document provides information on the steps needed to evaluate the Quectel L80, L80-R, L86 and LC86L modules using the Evaluation Board (EVB). The EVB is a convenient tool that allows you to become familiar with the 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 module firmware by using the QGPSFlashTool;
- 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. 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. Check **Table 1** for more information.

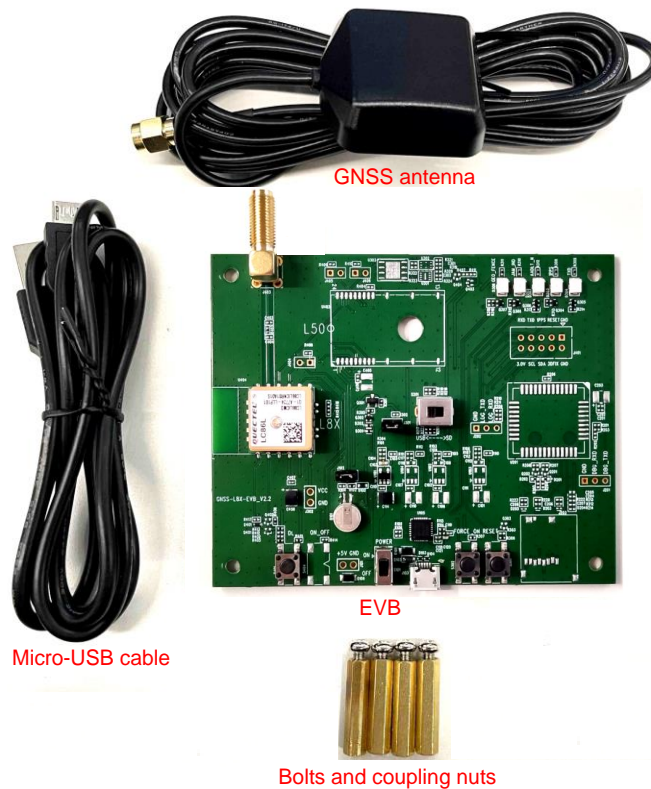


Figure 1: EVB Kit Accessories

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	Active GNSS Antenna ¹ Request the Antenna Datasheet from Quectel Technical Supports.	1
Instruction Sheet	The sheet 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 more 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

Make sure that the Active GNSS Antenna is placed so as to have a clear unobstructed view of the sky.

¹ As the L80-R module does not support an external antenna, the active antenna is not included in the EVB kit for L80-R.

3 Board User Interfaces

3.1. EVB Top View

EVB top view is shown in the figure below.

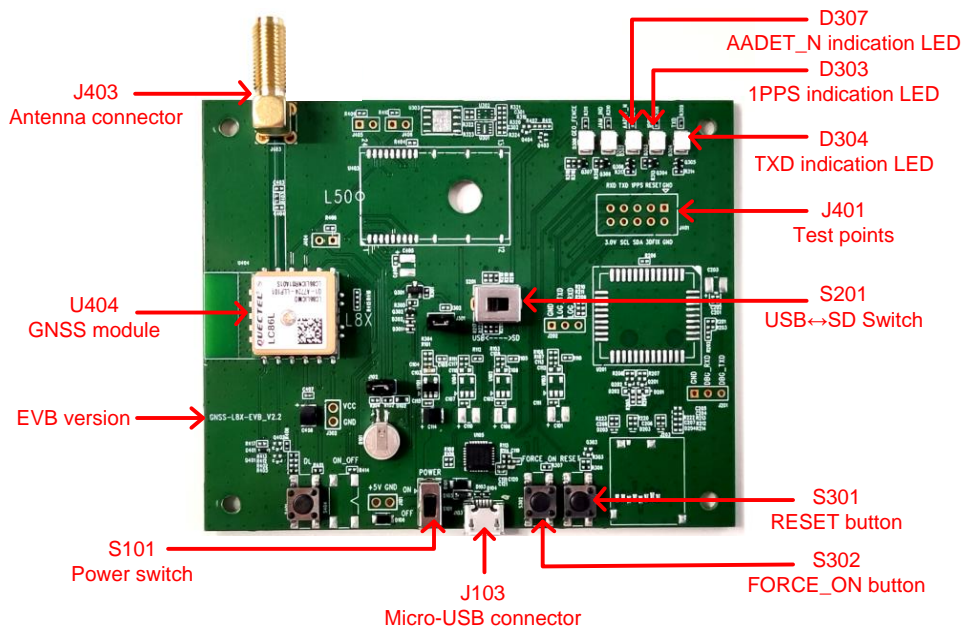


Figure 3: EVB Top View

3.2. 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: <ul style="list-style-type: none"> ● DC power supply: 4.5–5.5 V, typ. 5.0 V ● Current capability should be > 50 mA
Communication Interface	J103 Micro-USB	NMEA sentence output and command input
RF Input	J403 Antenna Connector ²	The antenna in the Kit supports: <ul style="list-style-type: none"> ● GPS L1 C/A ● QZSS L1 C/A ● Galileo E1 (<i>For LC86L (C) only</i>) ● BeiDou B1I (<i>For LC86L only</i>) ● GLONASS L1 ³ ● SBAS L1
Signal Indication	D303 1PPS Indication LED	Flashing: Successful position fix. Frequency: 1 Hz. Extinct: No position fix.
	D304 TXD Indication LED	Flashing: The module is turned on successfully. Data output from UART TXD pin. Extinct or Bright: Failed to turn on the module.
	D307 AADET_N Indication LED ⁴	Bright: External active antenna is being used. Extinct: Internal antenna is being used.
Switches and Buttons	S101 Power Switch	Powers the EVB on/off.
	S301 RESET	Short press the button to reset the module.
	S302 FORCE_ON ⁵	Short press the button to wake up the module from the Backup mode.
	S201 USB↔SD Switch	Switches the data communication port. Keep the switch on “ USB ” side, as the modules do not support the SD-card function.

² The antenna connector is invalid for the L80-R module, as the module does not support any external antenna.

³ GLONASS is not supported by L80 and L80-R modules. L80 and L80-R are GPS-only modules, and support GPS, QZSS, and SBAS constellations.

⁴ The L80-R does not support active antenna detection interface, so D307 is invalid on this module.

⁵ The L80 and L80-R modules do not support the FORCE_ON interface, so the FORCE_ON button is invalid on them.

Test Points J401
 Test Points Pins are detailed in **Table 3** below.

Test point distribution is shown below:

J401 Pin Assignment

RXD	TXD	1PPS	RESET	GND
3.0V	SCL	SDA	3DFIX	GND

Table 3: J401 Pin Detailed Description

Pin Name	I/O	Description
3.0V	PI	Not used
SCL	I/O	I2C serial clock
SDA	I/O	I2C serial data
3DFIX ⁶	DO	3D fix indication
GND	-	Ground
RXD	DI	Receives data
TXD	DO	Transmits data
1PPS	DO	1 pulse per second
RESET	DI	Resets the module
GND	-	Ground

⁶ For L80, L86, and L80-R EVBs, keep the test point (3DFIX) reserved.

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

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

4.1. Communicating 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 (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, as shown in the figure below.



Figure 4: USB Port

Step 5: Install the QCOM tool provided by Quectel. The QCOM tool interface for COM port setting is shown in the figure below.

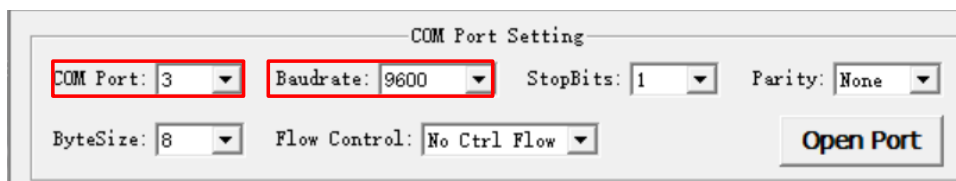


Figure 5: COM Port Setting Interface of QCOM

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

5 Testing with QGNSS Tool

This chapter explains how to use the QGNSS software tool for verifying the status of GNSS modules. For more information about QGNSS use, see [document \[2\]](#).

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

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 modules support 9600 bps by default).

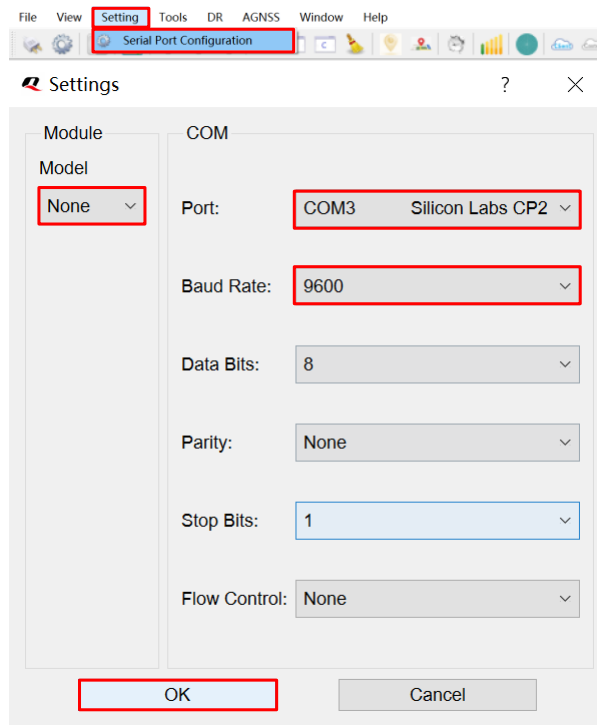



Figure 7: QGNSS Setting

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

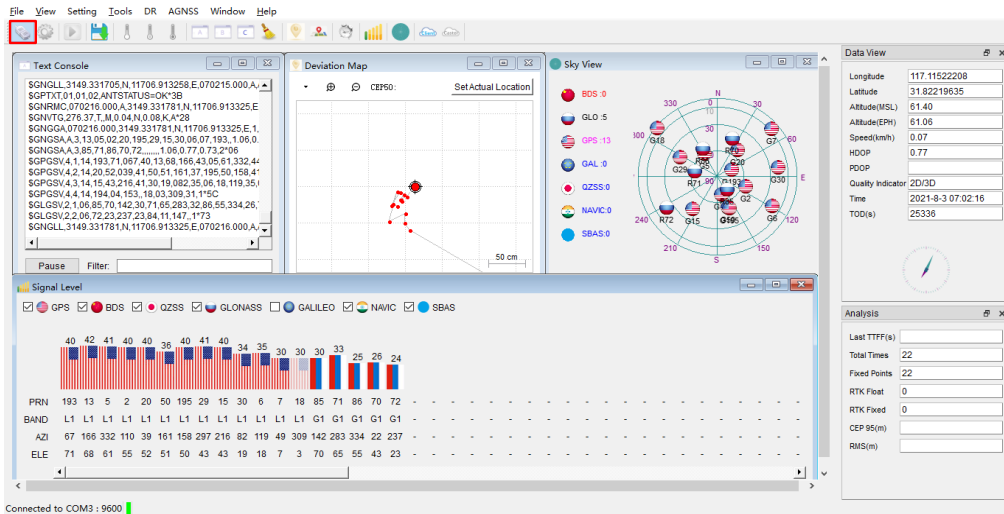
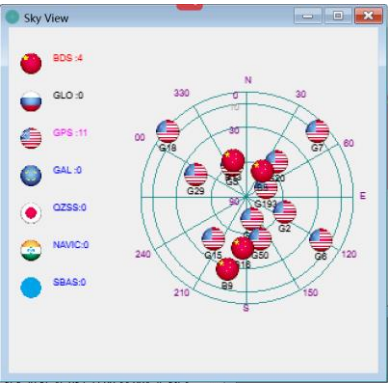


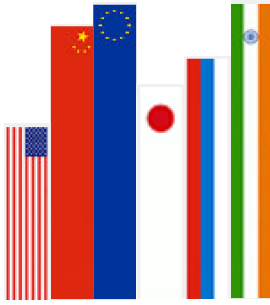
Figure 8: QGNSS Interface (Connected)

5.1.1. QGNSS Interface Explanation

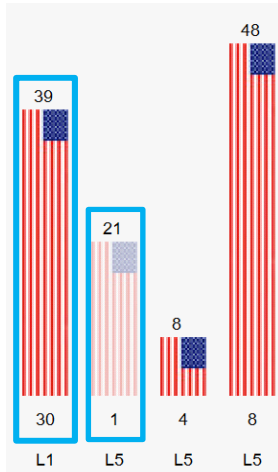
You can view GNSS information, such as CNR message, time, position, speed, and precision in the QGNSS interface. See the table below to find out more about these parameters.

Table 4: 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 show the satellites in use and their numbers. <ul style="list-style-type: none"> ● 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.

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: 2D/3D
- UTC date and time
- Time of day ⁷ (unit: second)
- Age of differential GPS data
- Last TTFF (unit: second)

⁷ 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 Upgrade via QGPSFlashTool

Quectel L80, L80-R, L86 and LC86L modules upgrade firmware via the UART interface using QGPSFlashTool. For more information about QGPSFlashTool use, see **document [3]**.

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

6.1. Firmware Upgrading

Before you start the firmware upgrading 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 upgrading steps:

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

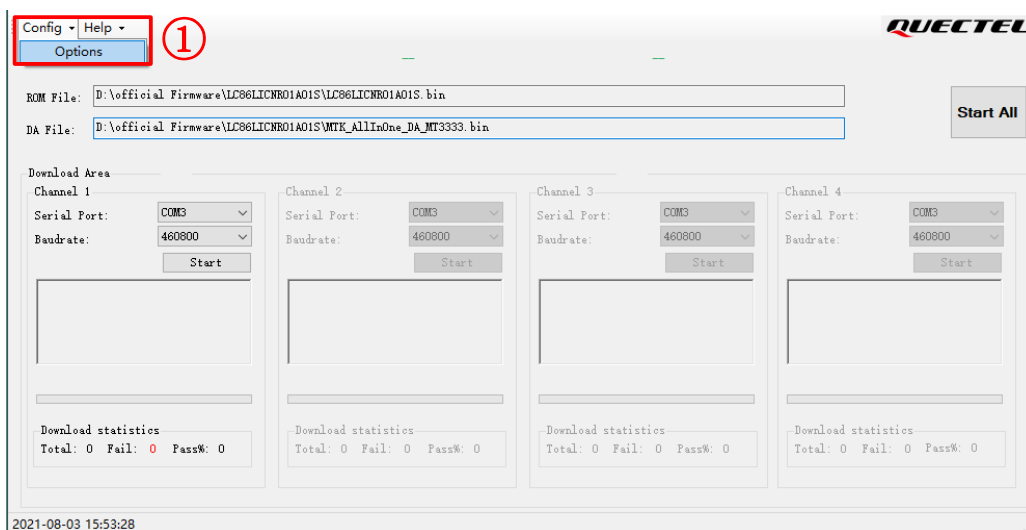


Figure 9: Firmware Upgrading – Step 1

Step 2: In the “Options” popup window, set the number of channels to be used. In the “Tool Options” drop-down list, select the model name such as “LC86L”⁸, then click “OK”.

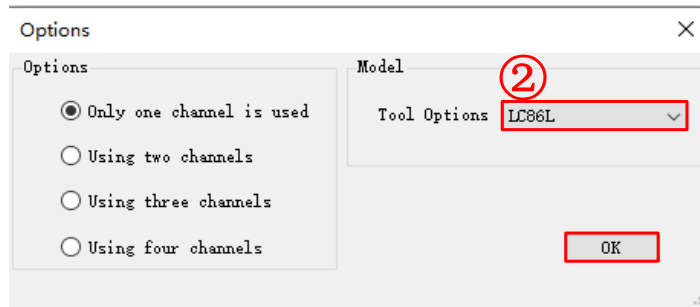


Figure 10: Firmware Upgrading – Step 2

Step 3: Double-click the “ROM file” selection box to select the ROM file, e.g. “LC86LICNR01A01S.bin”, then double-click the “DA File” selection box to select the DA file, e.g. “MTK_AllInOne_DA_MT3333.bin”, as shown the figure below.

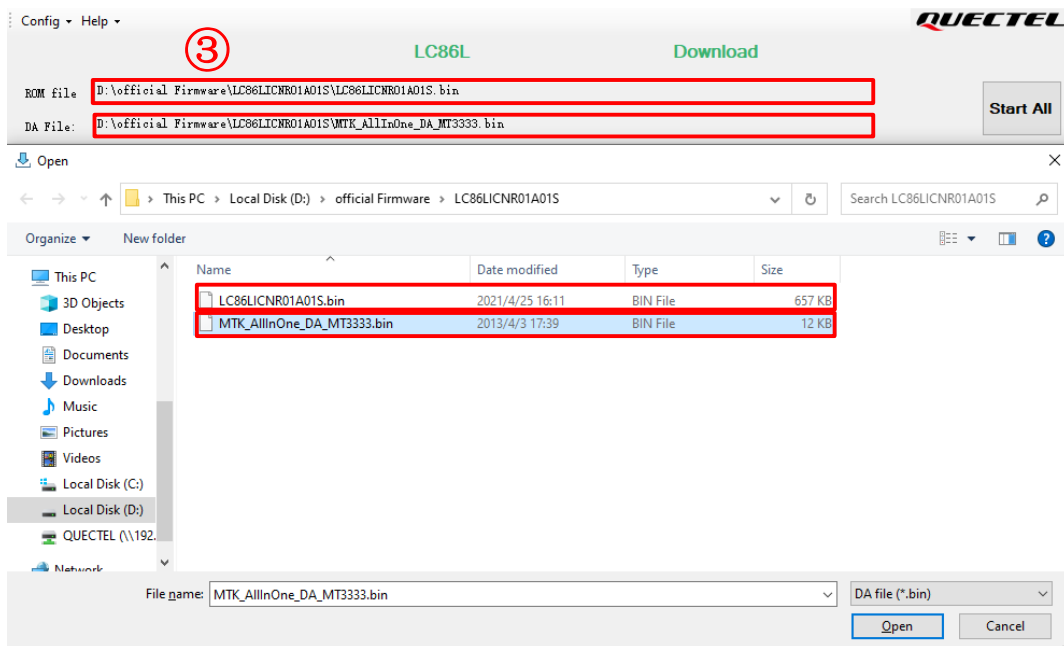


Figure 11: Firmware Upgrading – Step 3

Step 4: Select the “Serial Port” and “Baudrate” of the COM Port that will be used, then click the “Start” button to start downloading the firmware.

⁸ For L80 and L80-R modules, select “L80”; for L86 module, select “L86”.

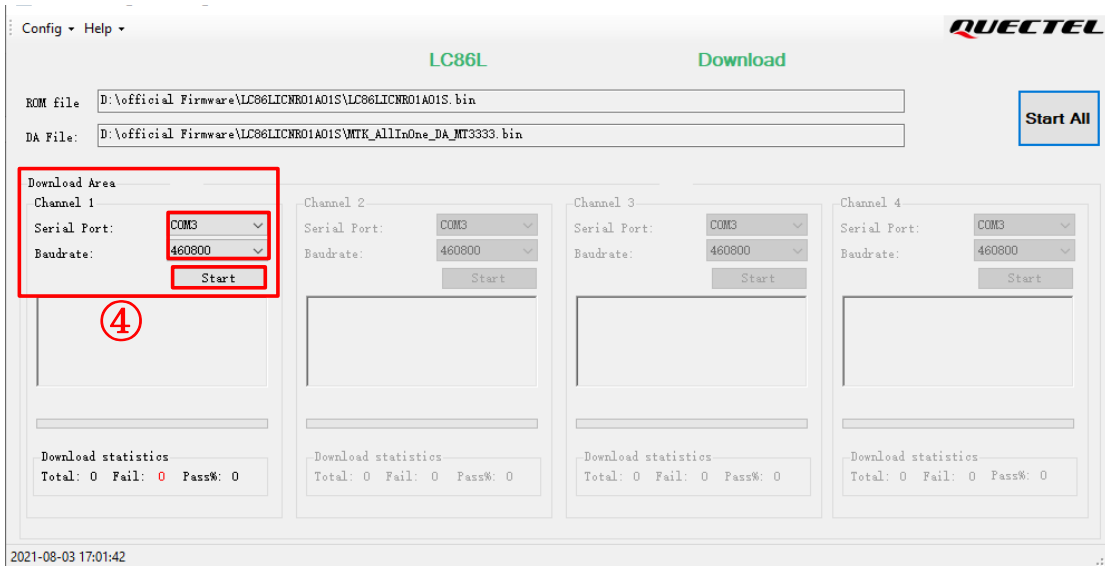


Figure 12: Firmware Upgrading – Step 4

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

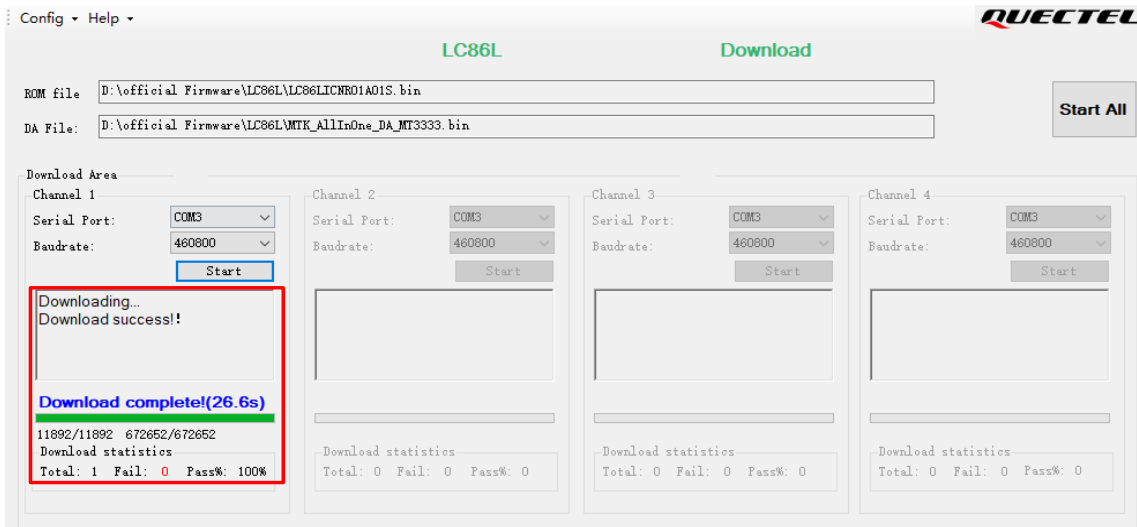


Figure 13: Successful Firmware Upgrading

7 Appendix Reference

Table 5: Related Documents

Document Name	
[1]	Qectel_QCOM_User_Guide
[2]	Qectel_QGNSS_User_Guide
[3]	Qectel_QGPSFlashTool_User_Guide

Table 6: Terms and Abbreviations

Abbreviation	Description
2D	2 Dimension
3D	3 Dimension
BeiDou	BeiDou Navigation Satellite System
COM Port	Communication Port
CNR	Carrier-to-Noise Ratio
DC	Direct Current
DI	Digital Input
DO	Digital Output
ESD	Electrostatic Discharge
EVB	Evaluation Board
Galileo	Galileo Satellite Navigation System (EU)
GND	Ground
GNSS	Global Navigation Satellite System

GPS	Global Positioning System
GLONASS	Global Navigation Satellite System (Russia)
I2C	Inter-Integrated Circuit
I/O	Input/Output
LED	Light Emitting Diode
LNA	Low-Noise Amplifier
Micro-USB	Micro Universal Serial Bus
NMEA	National Marine Electronics Association
PC	Personal Computer
PCB	Printed Circuit Board
1PPS	One Pulse Per Second
PRN	Pseudorandom Noise
QZSS	Quasi-Zenith Satellite System
RF	Radio Frequency
RXD	Receive Data (Pin)
RTK	Real-Time Kinematic
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
