

L76C EVB User Guide

GNSS Module Series

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Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

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

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

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History

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1 Introduction

This document defines and specifies the usage of L76C EVB (Evaluation Board) which is an assistant tool for engineers to develop and test Quectel L76C module.

1.1. 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 L76C module. Manufacturers of the cellular terminal should send the following safety information to users and operating personnel, and incorporate these guidelines into all manuals supplied with the product. If not so, Quectel assumes no liability for customers' failure to comply with these precautions.



Full attention must be given to driving at all times in order to reduce the risk of an accident. Using a mobile while driving (even with a handsfree kit) causes distraction and can lead to an accident. Please comply with laws and regulations restricting the use of wireless devices while driving.



Switch off the cellular terminal or mobile before boarding an aircraft. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. If the device offers an Airplane Mode, then it should be enabled prior to boarding an aircraft. Please consult the airline staff for more restrictions on the use of wireless devices on boarding the aircraft.



Wireless devices may cause interference on sensitive medical equipment, so please be aware of the restrictions on the use of wireless devices when in hospitals, clinics or other healthcare facilities.



Cellular terminals or mobiles operating over radio signals and cellular network cannot be guaranteed to connect in all possible conditions (for example, with unpaid bills or with an invalid (U)SIM card). When emergent help is needed in such conditions, please remember using emergency call. In order to make or receive a call, the cellular terminal or mobile must be switched on in a service area with adequate cellular signal strength.



The cellular terminal or mobile contains a transmitter and receiver. When it is ON, it receives and transmits radio frequency signals. RF interference can occur if it is used close to TV set, radio, computer or other electric equipment.



In locations with potentially explosive atmospheres, obey all posted signs to turn off wireless devices such as your phone or other cellular terminals. Areas with potentially explosive atmospheres include fuelling areas, below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles such as grain, dust or metal powders, etc.

2.1. Top and Bottom Views

Figure 1: Top View of L76C EVB

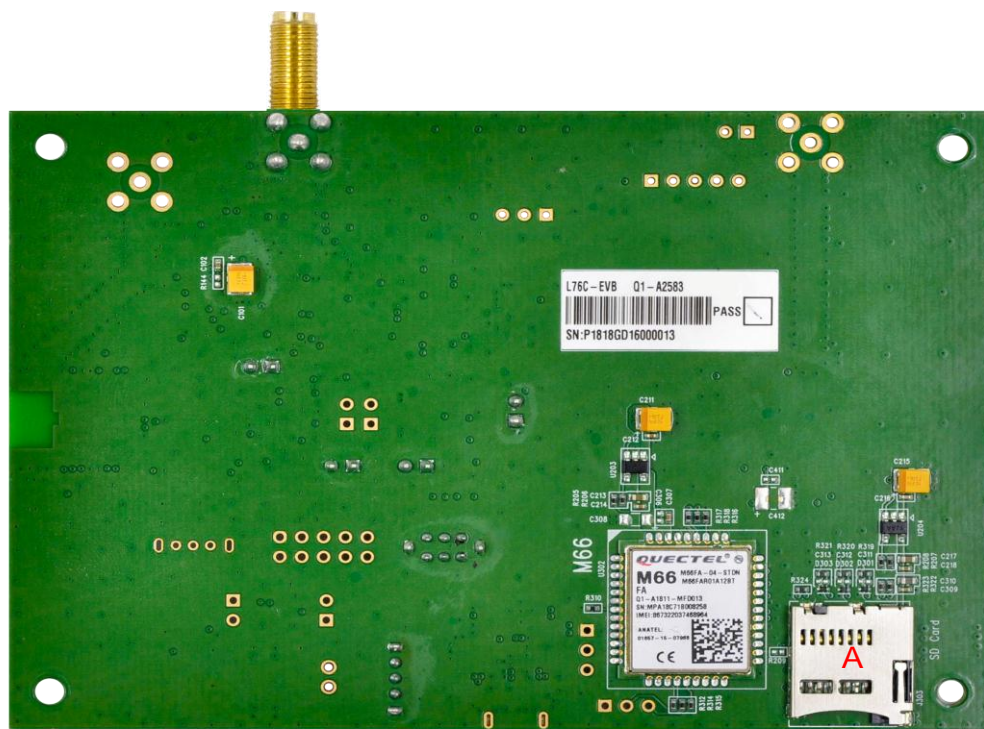


Figure 2: Bottom View of L76C EVB

Table 1: Interfaces of L76C EVB

SN.	Reference Number	Description
A	J303	SD card interface
B	S301	USB \leftrightarrow SD (serial port alternation switch)
C	S102	RESET button
D	S103	Reserved
E	S201	POWER switch
F	J201	Micro-USB interface
G	D105, D106	Indication LEDs
H	J101	Antenna interface
I	U101	L76C module
J	J106	Test points

2.2. Key Features

The following table describes the detailed features of L76C EVB.

Table 2: Key Features of L76C EVB

Features	Implementation
Power Supply	DC power supply (J201): 4.5V~5.5V, typically: 5.0V
SD Card Interface	SD card for NEMA output data storage
Micro-USB Interface	Power supply and NEMA sentence output
Signal Indication	2 LEDs are available for signal indication
Switches and Buttons	POWER Switch (S201) RESET (S102) USB ↔ SD (serial port alternation switch) (S301)
Physical Characteristics	Size: 115mm × 80mm

2.3. EVB Kit Accessories

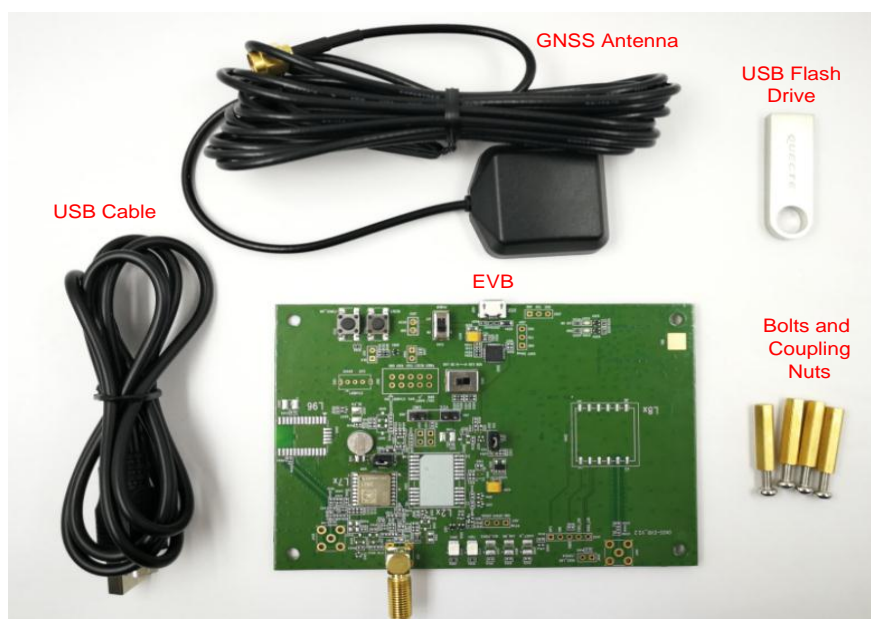


Figure 3: EVB Kit Accessories

Table 3: List of Accessories

Items	Description	Quantity
EVB	L76C EVB	1
Cable	USB cable	1
Antenna	Active GNSS antenna	1
USB Flash Drive	GNSS_EVB_Micro-USB_Driver_CP210x	1
Instruction Sheet	A sheet of paper giving instructions for EVB connection, details of EVB accessories, etc.	1
Others	Bolts and coupling nuts	4 for each type

3 Interface Applications

3.1. Micro-USB Interface

The main power is supplied via a Micro-USB interface. Both Micro-USB and SD card interfaces can be used for data communication, and they can be switched to each other by the alternation switch (S301). If SD card interface is used for data communication (NMEA sentence output), then both SD card and Micro-USB cables are necessary for operating the EVB. So it is strongly recommended to use the Micro-USB interface for both power supply and NMEA sentence output, during which only a USB cable is needed.

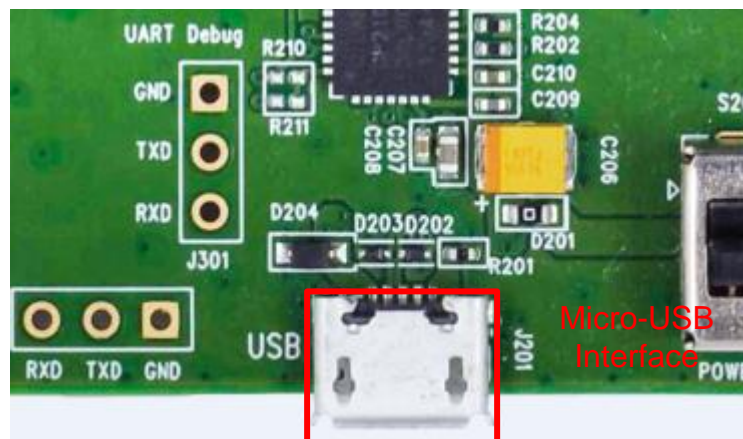


Figure 4: Micro-USB Interface

3.2. SD Card Interface

The interface supports SD card to store module output data. The memory storage capacity of supported SD card should be no more than 32GB.

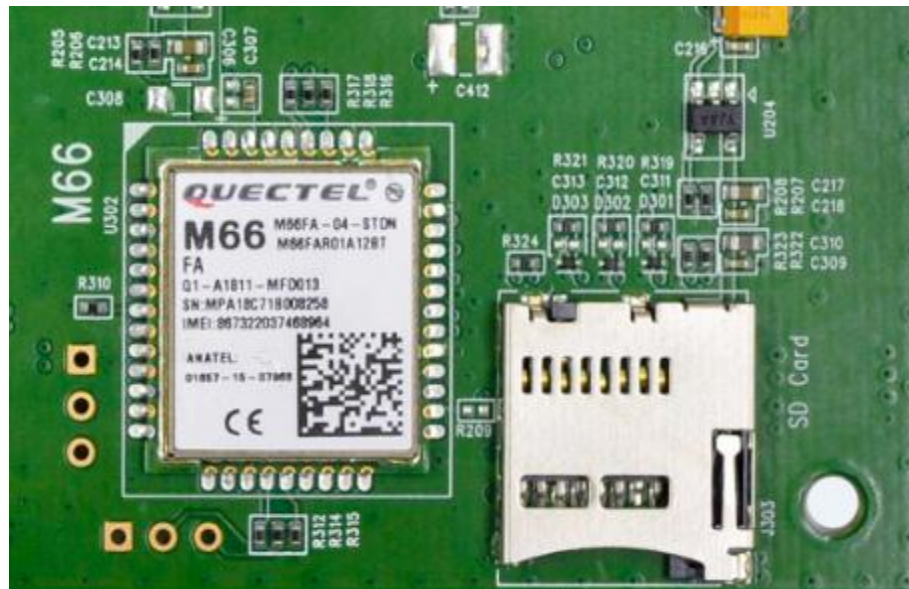


Figure 5: SD Card Interface

3.3. Antenna Interface

The L76C module can be connected to a dedicated passive or active GNSS antenna and it has a built-in LNA to improve sensitivity. The antenna interface is used for connection with an external antenna.



The following illustrates the switches and buttons of the EVB.



Table 4: L76C Switches and Buttons

Part No.	Name	I/O	Description
S102	RESET	DI	Press and then release the button, the module will be reset.
S103	-	-	Reserved
S201	POWER	PI	Control power supply via Micro-USB interface.
S301	USB ↔ SD (serial port alternation switch)	IO	L76C EVB supports data communication via both Micro-USB and SD card interfaces which are controlled and switched by the S301 switch.

3.5. Operation Status Indication LEDs

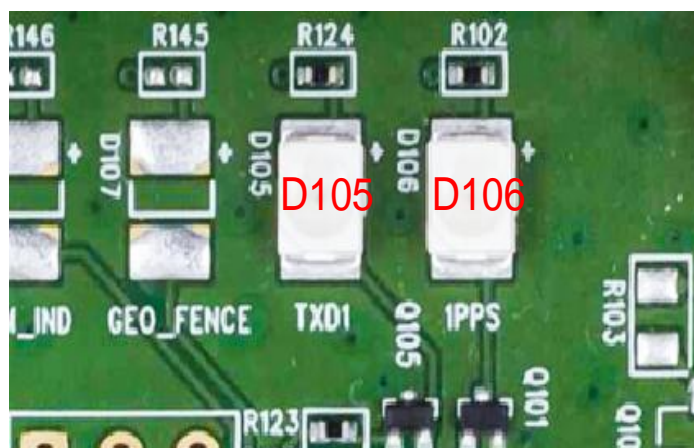


Figure 8: Operation Status Indication LEDs

Table 5: Operation Status Indication LEDs

Part	Name	I/O	Description
D105	TXD	DO	Flash: the module is turned on successfully, and either Micro-USB or SD card interface can be used to output messages. Extinct: failed to turn on the module.
D106	1PPS	DO	Flash: successful fix. The frequency is 1Hz. Extinct: no fix.

3.6. Test Points

The following figure illustrates the test points of the EVB.

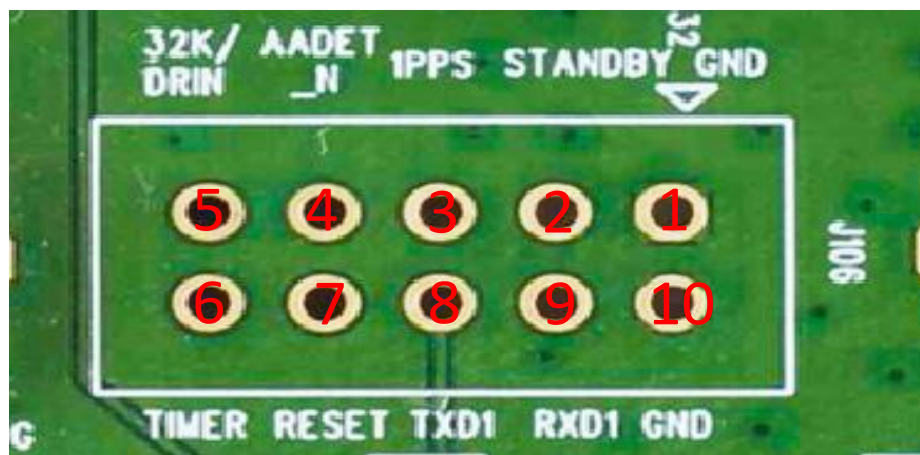


Figure 9: L76C EVB Test Points - J106

Table 6: Pin Description of J106

Pin No.	Signal	I/O	Description
1/10	GND	-	Ground
2	NC	-	Reserved
3	1PPS	DO	1 pulse per second
4	NC	-	Reserved
5	NC	-	Reserved
6	NC	-	Reserved
7	RESET	DI	System reset
8	TXD1	DO	Transmit data
9	RXD1	DI	Receive data

4 EVB and Accessories Assembly

The following figure shows the assembly of L76C EVB and its accessories.



Figure 10: L76C EVB and Accessories Assembly

5 EVB Operation Procedures

This chapter mainly illustrates the operation procedures of L76C EVB.

5.1. Communication via USB Interface

Step 1: Connect the EVB and the PC with a USB cable through USB interface, and then switch S201 to **ON** state to power on the EVB.

Step 2: Run the USB flash drive on PC to install the USB driver. The USB port numbers can be viewed through the PC Device Manager, shown as below.

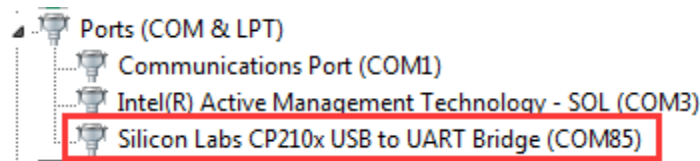


Figure 11: USB Ports

Step 3: Install and then use the QCOM tool provided by Quectel to realize the communication between the L76C module and the PC.

The following figure shows the COM Port Setting interface of QCOM: select the correct “**COM Port**” (USB Port shown in the above figure) and set the correct “**Baudrate**” (the default value: 9600bps). For more details of QCOM usage, please refer to *Quectel_QCOM_User_Guide*.

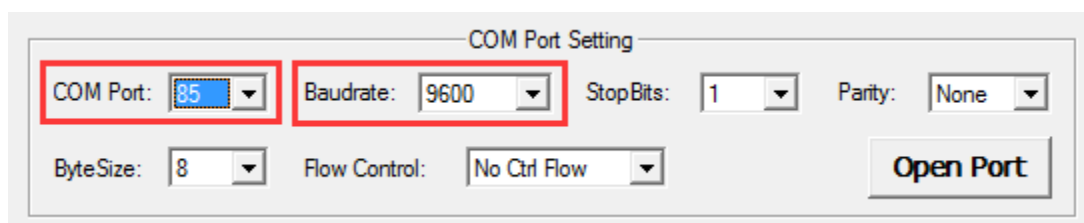


Figure 12: COM Port Setting Interface of QCOM

5.2. Firmware Upgrade

Quectel L76C module upgrades its firmware via USB interface by default. Please follow the procedures below to upgrade the firmware.

Step 1: Install and open the firmware upgrade tool (Firebird Update FW Tool) on PC.

Step 2: Power on the EVB according to the procedures mentioned in step 1 of **Chapter 5.1**.

Step 3: Follow the steps below to start firmware upgrade.

- a) Select the COM port.
- b) Choose the firmware package.
- c) Click the “**Baud rate**” dropdown list and select “**9600**”.
- d) Click the “**START**” button to upgrade the firmware.

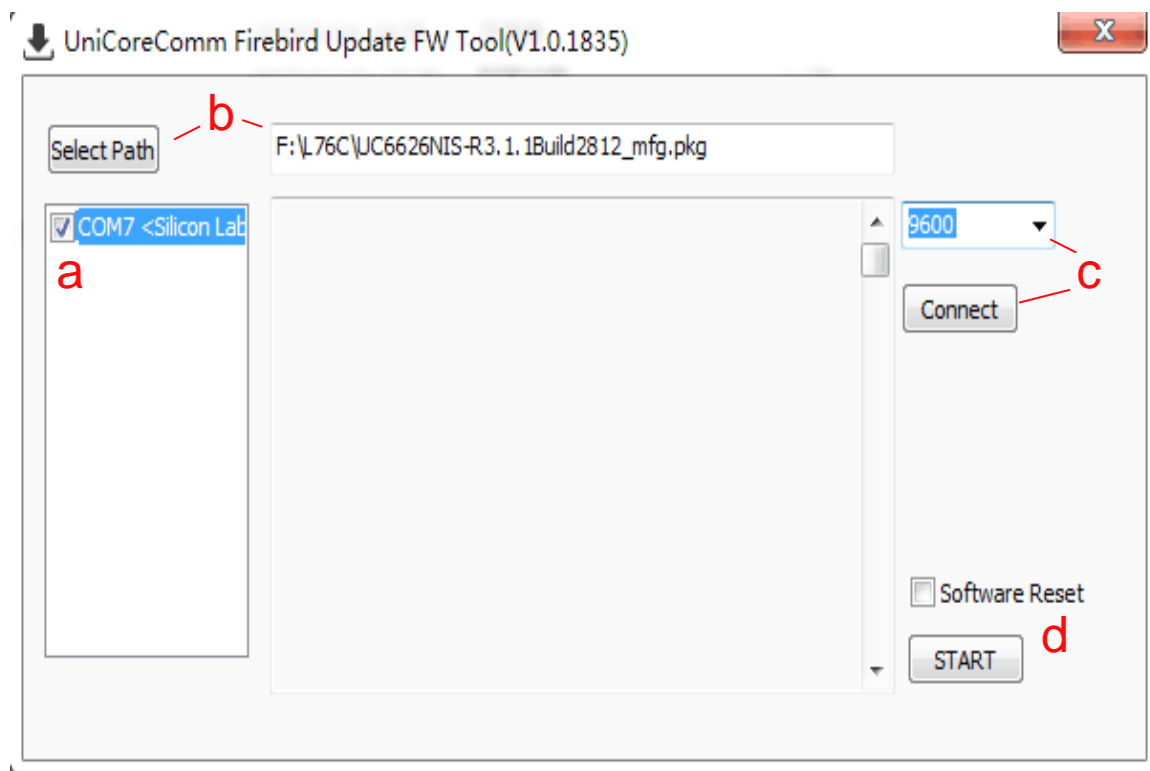


Figure 13: Firebird Update FW Tool Configurations for Firmware Upgrade

6 Usage of uSTAR

6.1. uSTAR Interface

6.1.1. COM Port and Baud Rate Setting

The uSTAR tool can help users to view the status of GNSS receiver conveniently.

After EVB accessories are assembled, turn on the module and start up the uSTAR. After the tool is opened, the following interface will be shown:

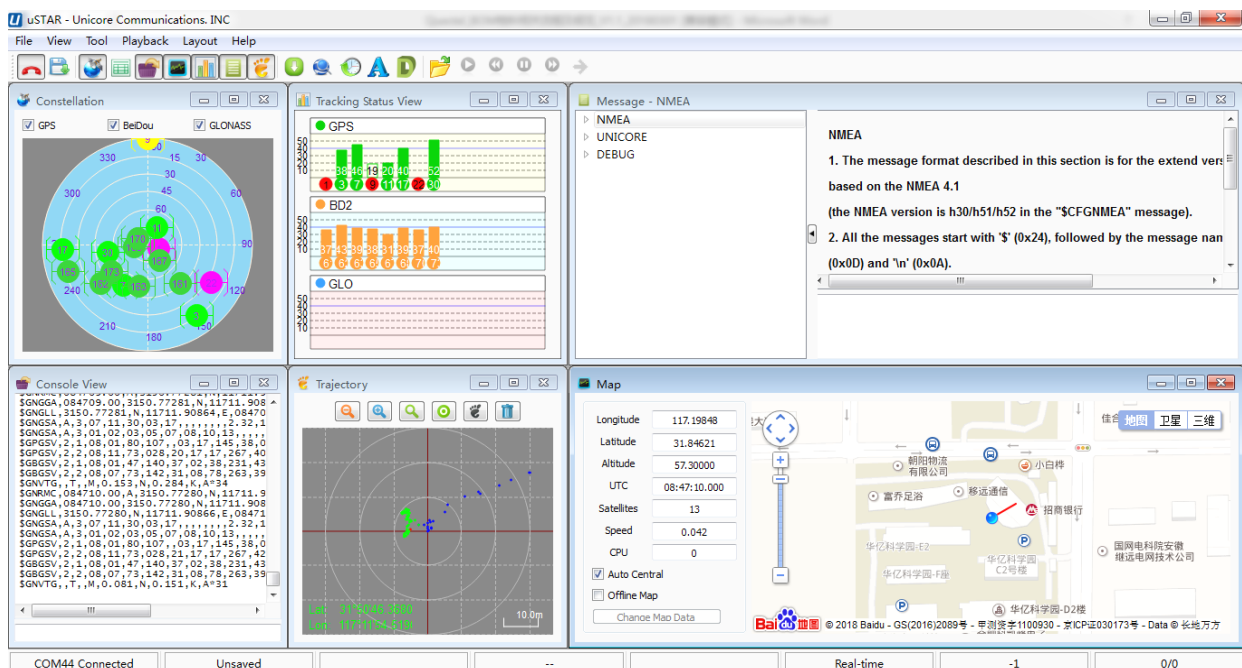


Figure 14: uSTAR Tool Interface

After that, select a correct COM port and baud rate (L76C module supports 9600bps by default), then click the button “OK”.

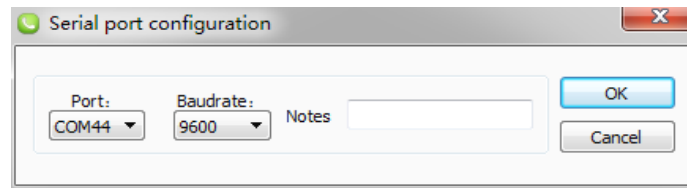
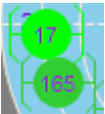

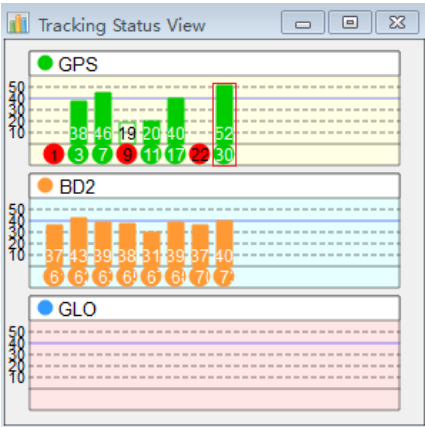


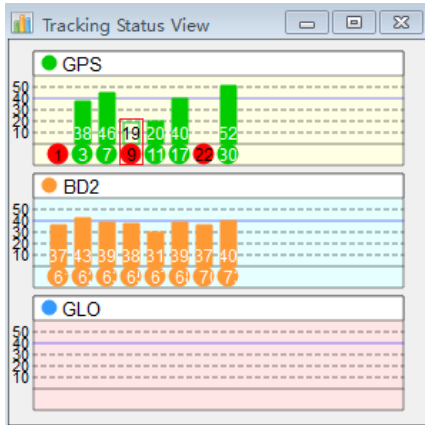
Figure 15: COM Port and Baud Rate Selection

6.1.2. Explanations of uSTAR Interface

From the uSTAR interface, users can view CNR message, time, position, speed, precision, and so on. Explanations are listed in the table below.

Table 7: Explanations of uSTAR Interface

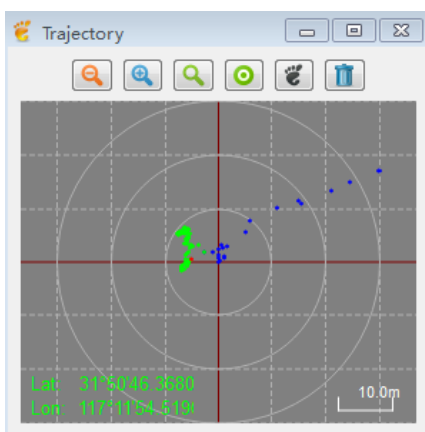
Icon	Explanation
	<ul style="list-style-type: none"> SV with PRN 17 and 165. If the position of SV is near to the centre of the Sky View, the elevation angle of SV is close to 90°. Green or dark green means this satellite is in tracking.
	<ul style="list-style-type: none"> Fuchsia means this satellite is not in tracking.
	<ul style="list-style-type: none"> The CNR of PRN 30 is 52dB/Hz. Green column means the navigation data of the GPS satellite is in use. Orange column means the navigation data of the BeiDou satellite is in use.



- The CNR of PRN 9 is 19dB/Hz.
- White column means the navigation data of this satellite is not in use.

Longitude	117.19848
Latitude	31.84621
Altitude	57.30000
UTC	08:47:10.000
Satellites	13
Speed	0.042
CPU	0

- Longitude degree
- Latitude degree
- Altitude based on WGS84 datum
- UTC time
- The number of satellites being used
- Speed of receiver
- CPU



- Trajectory

6.2. Command Sending

UNICORE and PQ* Commands can be sent by uSTAR. The command input box is shown as below.

NOTE

"*" means under development.

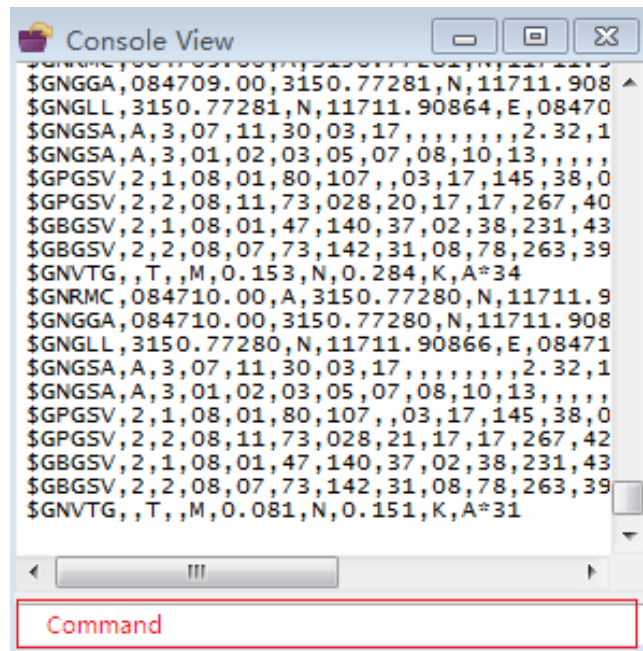


Figure 16: Command Sending via uSTAR

6.3. TTFF Testing

uSTAR tool allows customers to measure the TTFF (Time To First Fix) under different testing conditions. The TTFF can be tested under cold start, warm start or hot start conditions. Click the **“Start”** button to start the test and it can be stopped by clicking the **“Cancel”** button.

The following are the detailed configuration steps during TTFF testing:

Step 1: Start **“Tool”** menu, and then click **“TTFF”** to enter the interface shown as below:

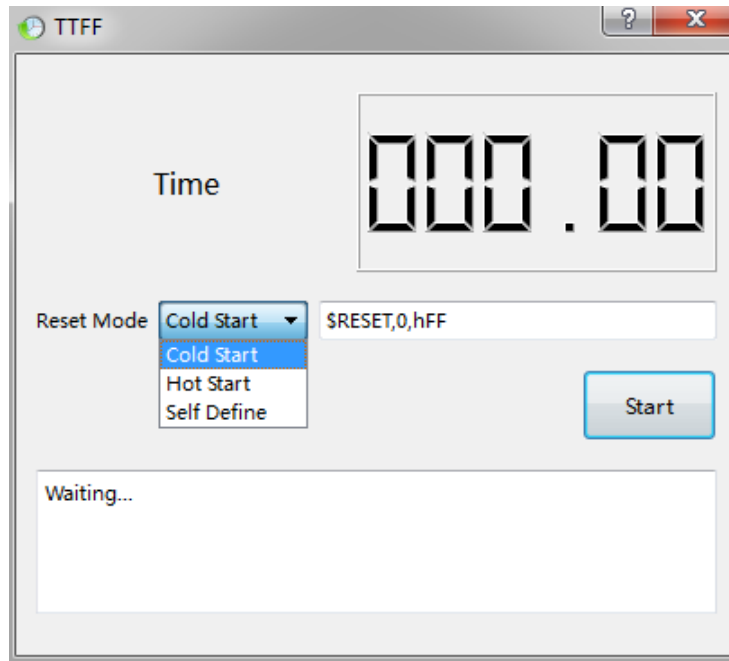


Figure 17: Static TTFF Testing via uSTAR

Step 2: For cold start TTFF testing

Please click the dropdown list after “Reset Mode” field to choose “Cold Start”, and then click “Start”, as shown below:

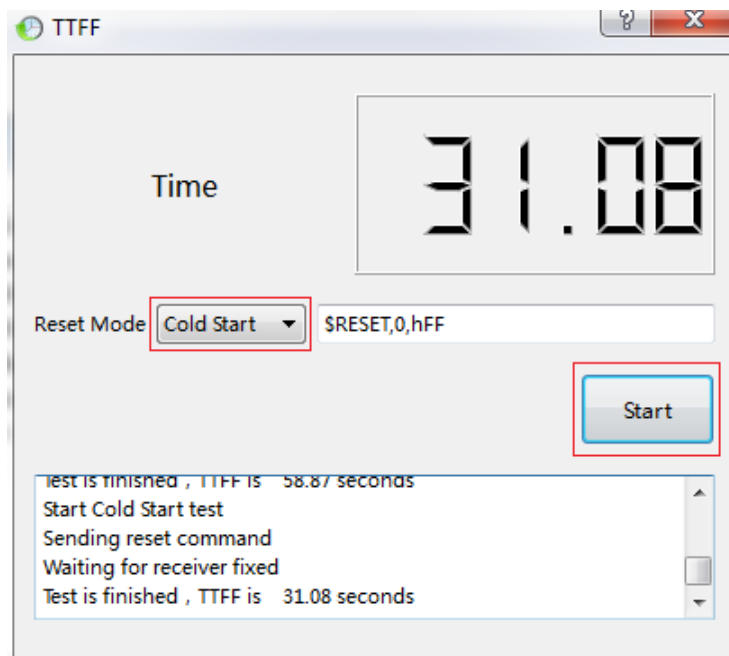


Figure 18: Cold Start TTFF Testing Configuration

For hot start TTFF testing

Please click the dropdown list after “Reset Mode” field to choose “Hot Start”, and then click “Start”, as shown below:

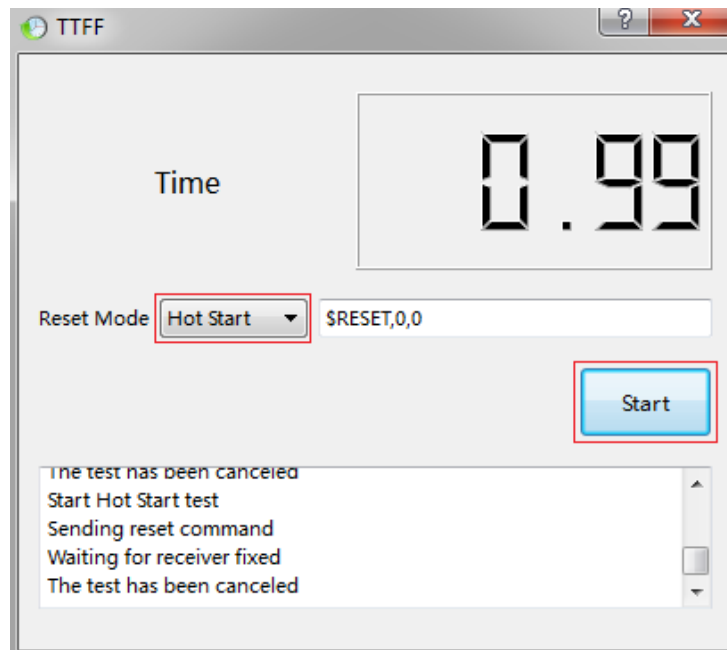


Figure 19: Hot Start TTFF Testing Configuration Options

For warm start TTFF testing

Please click the dropdown list after “Reset Mode” field to choose “Self Define”, then input command “\$RESET,0,h01”, and finally click “Start”, as shown below:

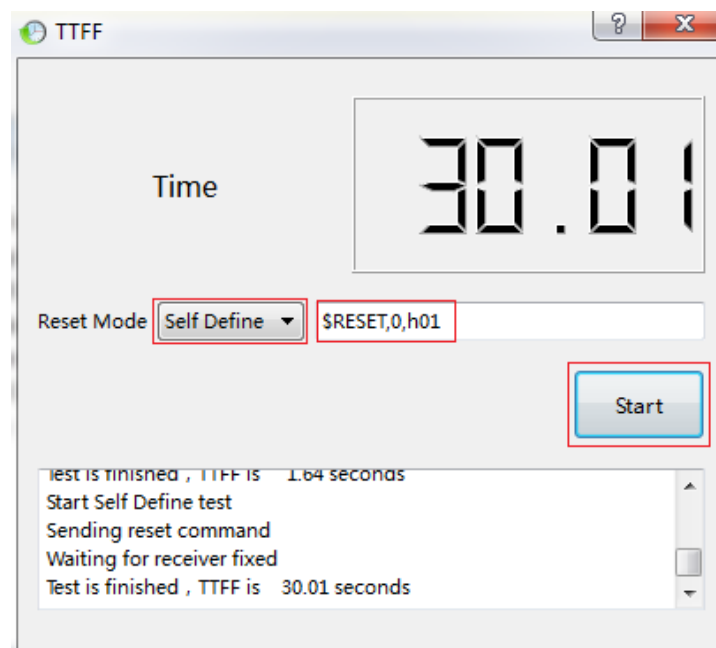


Figure 20: Warm Start TTFF Testing Configuration Options

7 Appendix A Reference

Table 8: Terms and Abbreviations

Abbreviation	Description
CNR	Carrier-to-Noise Ratio
DI	Digital Input
DO	Digital Output
EVB	Evaluation Board
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IO	Bidirectional
LED	Light Emitting Diode
LNA	Low Noise Amplifier
PI	Power Input
PPS	Pulse Per Second
PRN	Pseudorandom Noise
SV	Satellite Vehicle
TTFF	Time To First Fix
UTC	Universal Time Coordinated
WGS84	World Geodetic System 1984