SIM32ELA-EVB User Guide

GPS Module

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Contents

Table Index

Figure Index

1 Introduction

The purpose of this article is to introduce the interface and usage of the development kit.

Based on the SIMCom development kit, developers will quickly become familiar with and verify the software functions of the module.

1.1 Features Overview

The main features of SIM32ELA EVB are shown in the table below.

Table 1：Main features

Features	Description
Power supply	USB_VBUS：5V power supply
UART interface	Three USB-to-UART interfaces, Respectively for the main serial port and system log port
Signal indication	Three function indicator LED lights
Buttons	Two buttons for Exit_RTC/wake-up and download respectively
Jumper sockets	Four jumper sockets for Wake-up/Reset,active antenna power supply,3D-Fix and 1PPS output

1.2 SIM32ELA-EVB Top and Bottom View

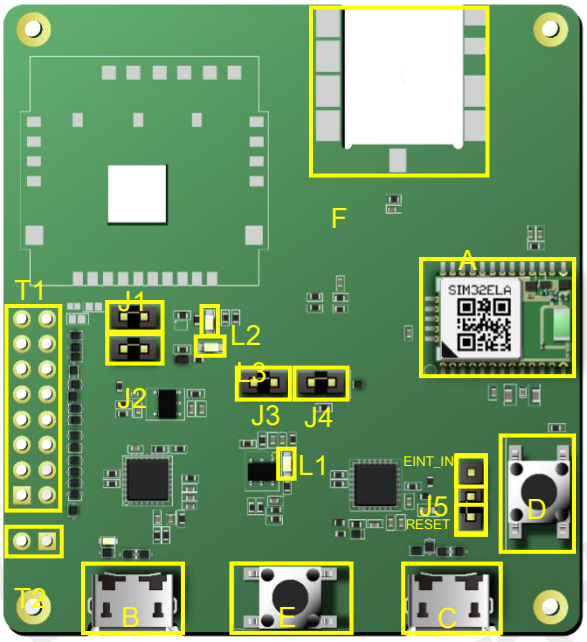

Figure 1: SIM32ELA-EVB top view

Figure 2：SIM32ELA-EVB bottom view

Table 2: Label information description

Label information	Description
A	SIM32ELA Module
B	Main serial port, used for AT commands and firmware upgrade
C	DBG serial port, used for system LOG capture
D	EINT_IN/RESET button
E	5V power supply button
F	GNSS antenna connector
L1	Power indicator light
L2	1PPS indicator light
L3	3D-FIX indicator light
J1	3D-FIX indicator jumper socket
J2	1PPS indicator jumper socket
J3	Active antenna power supply jumper socket
J4	Module power supply jumper socket
J5	EINT_IN/RESET jumper socket
T1,T2	Test point

1.3 SIM32ELA Evaluation Kit

Evaluation kit includes EVB board and other accessories.

The SIM32ELA kit list is as follows, please ensure that all kits are complete.

1) SIM32ELA-EVB board；
2) MICRO USB data cable。

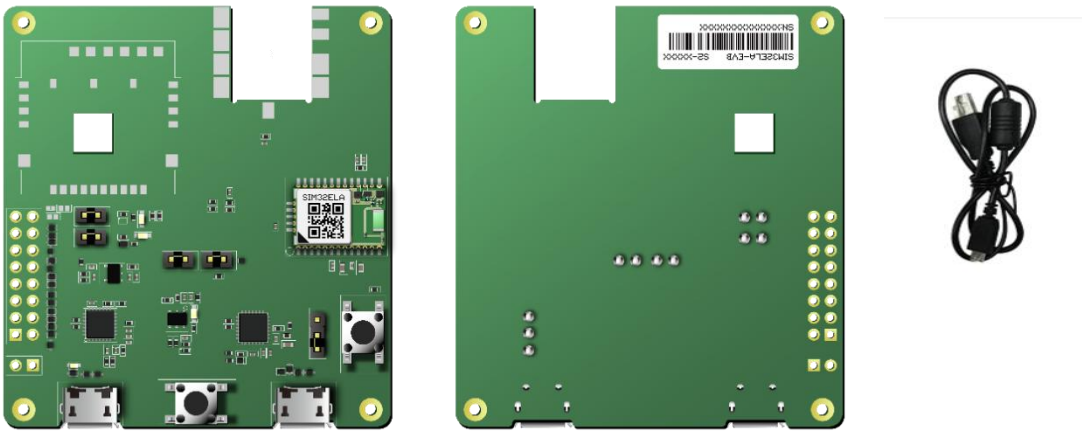

Figure 3: SIM32ELA Evaluation kit

Table 3: EVB Kit

EVB Kit	Description	quantity
SIM32ELA EVB	EVB board	1
MICRO USB data cable	MICRO USB data cable	1

To ensure that the module can be used normally, it is recommended to use the correct kit model. The part numbers of SIM32ELA EVB kit are shown in the table below.

Table 4: EVB Kit

EVB Kit	Part No
SIM32ELA EVBKIT	S2-10CS3

1.4 Interface Introduction

The interface of SIM32ELA EVB is shown in the table below.

Table 5: Interface introduction

Function	Reference number	Description
UART	J401	J401 is used for AT command communication, data transmission and firmware upgrade

	J402	J402 is used for software debugging
LEDs	D303	D303：Power status indicator light
	D304	D304：3D-FIX signal indicator light
	D305	D305：PPS signal indicator light
Buttons	S101	S101：Exit_UART SLEEP/RESET button
	S301	S301：5V supply button
Jumper sockets	J102	J102：Active antenna power supply jumper socket
	J103	J103：EINT_IN/RESET jumper socket
	J302	J302：Module power supply jumper socket
	J303	J303：3D-FIX indicator jumper socket
	J304	J304：1PPS indicator jumper socket
Test points	J105 J301	J301：Power test point J105：Module signal test point

More detailed introductions about the above functions are shown in the next section.

1.5 Power Supply

1.5.1 Power Supply

SIM32ELA EVB is powered by micro USB, USB plug-in connection device J401, J402 can achieve 5V power supply effect.

The power supply block diagram of SIM32ELA EVB is shown in the figure below.

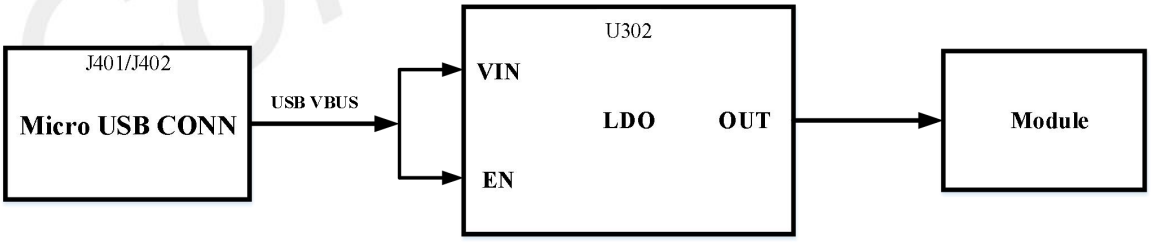

Figure 4: EVB Power supply block diagram

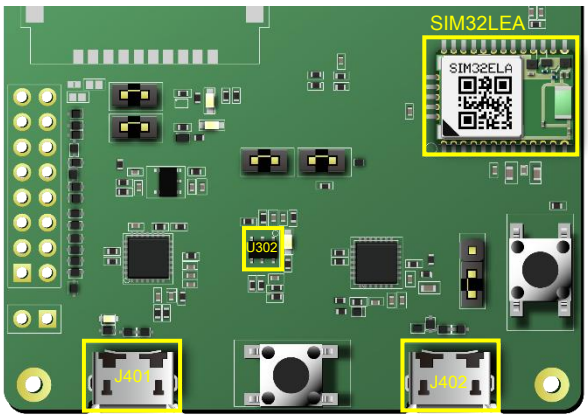

Figure 5: EVB power interface

1.5.2 Separate Power Supply

The module power supply reference design is shown in the figure below.

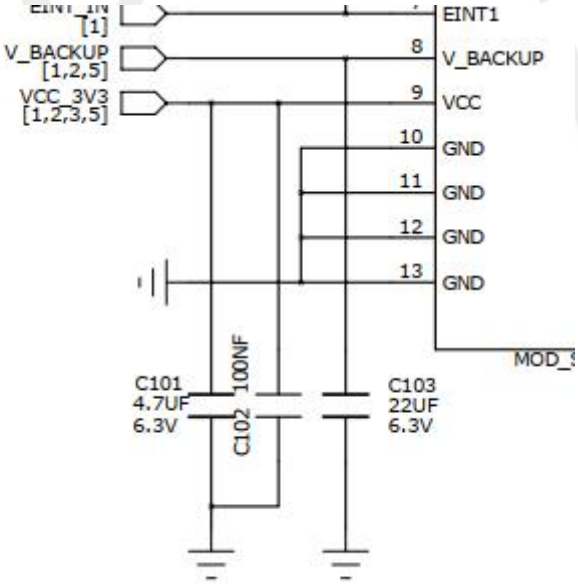

Figure 6: Module power supply reference design

The test points of VCC_3.3V and GND of the module are shown in the figure below. If the module needs to be powered separately, the jumper cap of J302 should be removed first, and then the VCC_3.3V and GND test points should be externally supplied with power.

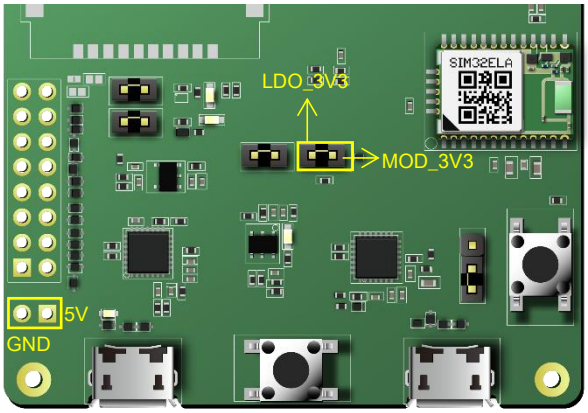

Figure 7: Module power supply separately (MOD_3.3V GND)

Note

1. The power supply range of the module is 2.8~4.3V, and the recommended power supply voltage is 3.3V. When the power supply voltage is lower than 3V, the GPS performance will degrade slightly.

1.6 UART Interface

SIM32ELA EVB provides two UART interfaces (J401, J402) by USB to UART. The J401 provides the dual serial port：Enhanced COM Port and Standard COM Port, the dual serial port is used as the main serial port for AT commands, data transmission and firmware upgrade. And J402 is used as DEBUG debugging serial port for software DEBUG debugging.

The reference circuit of USB to UART interface is shown in the figure below.

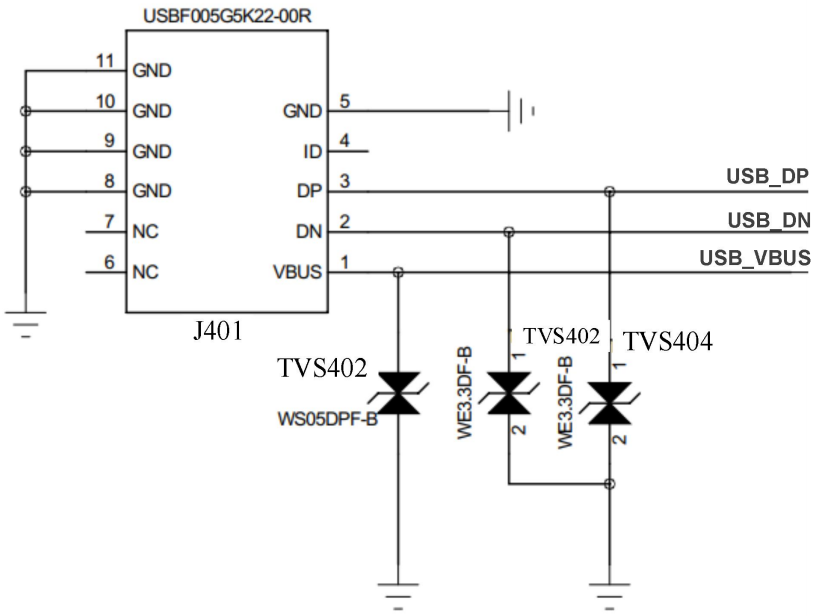

Figure 8: USB to UART reference design

The pin definition of the Micro USB interface is shown in the figure below.

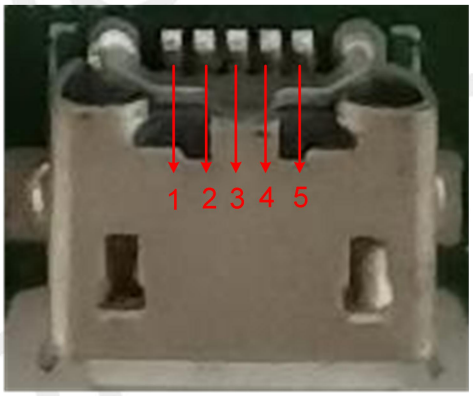

Figure 9: micro USB interface pin definition (J401)

Table 6: micro USB interface pin definition (J401)

Pin number	Pin name	I/O	Description
1	VBUS	O	USB power supply
2	USB_DM	I\O	USB differential data negative (USB-to-UART)
3	USB_DP	I\O	USB differential data positive (USB-to-UART)
4	\	\	Float
5	GND	\	Ground

1.7 Status Indicator Light

There are three status indicator lights D303 , D304 and D305 for function indication on SIM32ELA EVB.

The status indicators D303 , D304 and D305 are as shown in the figure below.

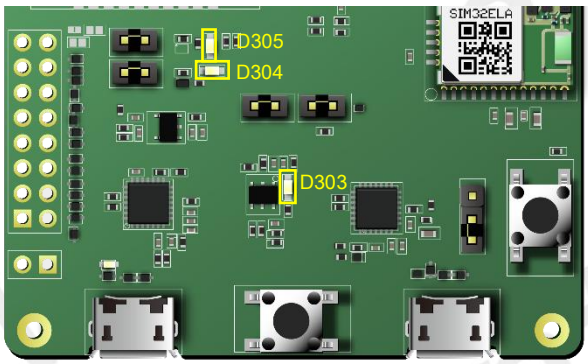

Figure 10: LED status indicator light (D303、D304、D305)

Table 7: Status indicator light description

LEDs number	LEDs Colour	Description
D303	Red	Power status indicator light
D304	Blue	3D-FIX signal indicator light
D305	Blue	1PPS signal indicator light

1.8 Buttons

There are two buttons (S101, S301) on SIM32ELA EVB.

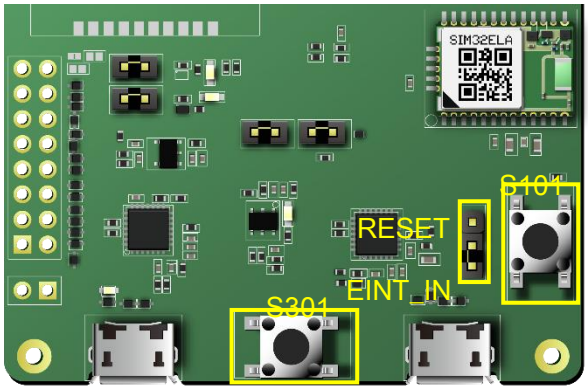

Figure 11: Buttons (S101, S301)

Table 8: Buttons

Number	Name	Description
S101	RESET/EINT_IN	Module reset/wake-up button
S301	5V ENALBE	5V power supply enable button

Note

To exit the sleep mode, you need to send the $PAIR002*38 command within 10ms of pressing the S101 button.

1.9 Jumper sockets

There are five sets of jumper sockets J102、J103、J302、J303、J304 on SIM32ELA EVB. The details of the test points are as follows.

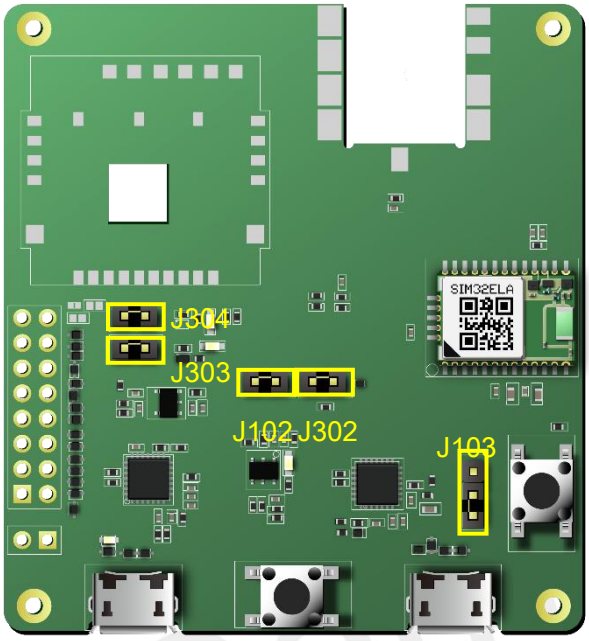

Figure 12: Jumper sockets

Table 9: Jumper sockets

Number	Name	Description
J102	ANT_3V3	Active antenna power supply jumper socket
J302	MOD_3V3	MOD_3V3 power supply jumper socket
J303	3D-FIX	3D-FIX indicator jumper socket
J304	1PPS	1PPS indicator jumper socket
J103	RESET/EINT_IN	Module reset/wake-up jumper socket

1.10 Test Points

There are two sets of test points J105 J301 on SIM32ELA EVB. The details of the test points are as follows.

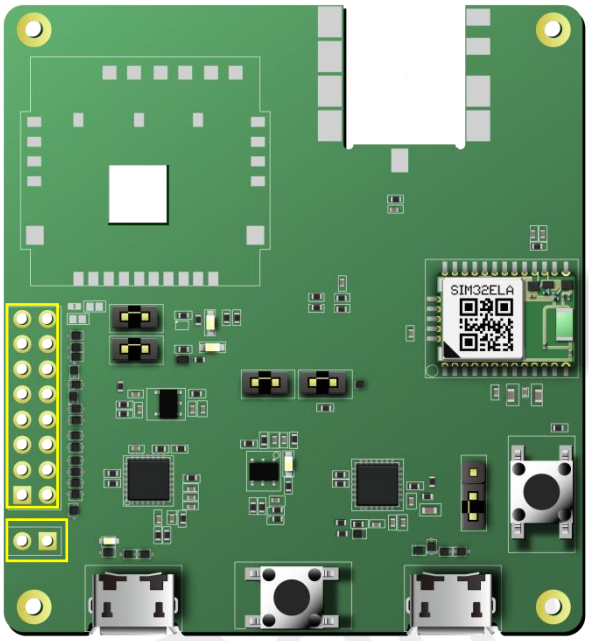

Figure 13: Test points location

The pin definition of position J105 and J301 is shown in the figure below.

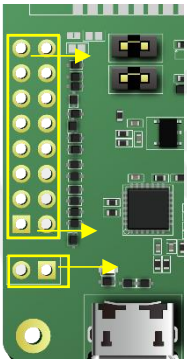

Figure 14: The pin definition of J105 and J301 on EVB

Table 10: Test point description of J105 on EVB

Position	Number	Name	Description
J105	J105_PIN1	GPIO7	General purpose input/output
	J105_PIN2	GND	Ground
	J105_PIN3	3D-FIX	Location flag. After the location is successful, the output is high
	J105_PIN4	V_TCXO	1.8V power output. High level indicating to host that the module is active.
	J105_PIN5	TXD1	RTCM function
	J105_PIN6	GPIO8	General purpose input/output

	J105_PIN7	RXD1	RTCM function
	J105_PIN8	1PPS	1PPS outputs timing pulse related to receiver time
	J105_PIN9	EINT_IN	Wake up SIM32ELA, low active , default pull high
	J105_PIN10	RXD0	NMEA serial input
	J105_PIN11	V_BACKUP	The backup battery input power supply for RTC
	J105_PIN12	TXD0	NMEA serial output
	J105_PIN13	VCC	Main power input, which will be used to power the baseband and RF section internally.
	J105_PIN14	GPIO2	General purpose input/output
	J105_PIN15	GPIO1	General purpose input/output
	J105_PIN16	NRESET	Reset signal

Table 11: The Pin description of location J301 on EVB

Position	Test point	Signal name	Description
J301	J301_PIN1	VCC_5V	EVB 5V power supply test point
	J301_PIN2	GND	Ground

※ Note

1. For the related functions of each pin of the module, please refer to document [1].

2 Operation Method

2.1 Module Boot

2.1.1 Module Power-on Operation

The module boot method is as follows：

Insert the Micro USB into the USB connector J401(or J402), and the module is powered on and automatically starts, and the D303 will light up.

2.2 Driver Installation

2.2.1 USB-to-UART Driver Installation

The following connection can get the USB to UART driver.

https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

After the driver is successfully installed, the following virtual serial port will appear, COM41/COM42/COM43.

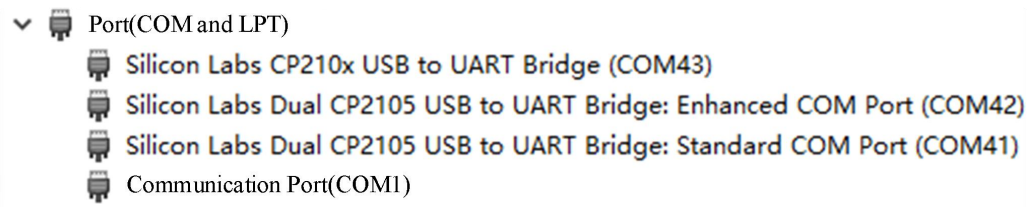

Figure 15: USB to UART ports

Table 12: USB to UART ports

Reference Number	Interface type	Port number	Serial port	Function description
J401	ECI	COM42	Enhance UART	Used for AT communication, data transmission and firmware upgrade
	SCI	COM41	Standard UART	Unused by default
J402	/	COM43	USB TO UART Bridge	Used for software DEBUG

2.3 SIMCom GPS Testing Tool

Please contact SIMCom to get the newest version of GPS Testing tool.

2.3.1 Port setting

The interface of the test tool is shown in the following figure.

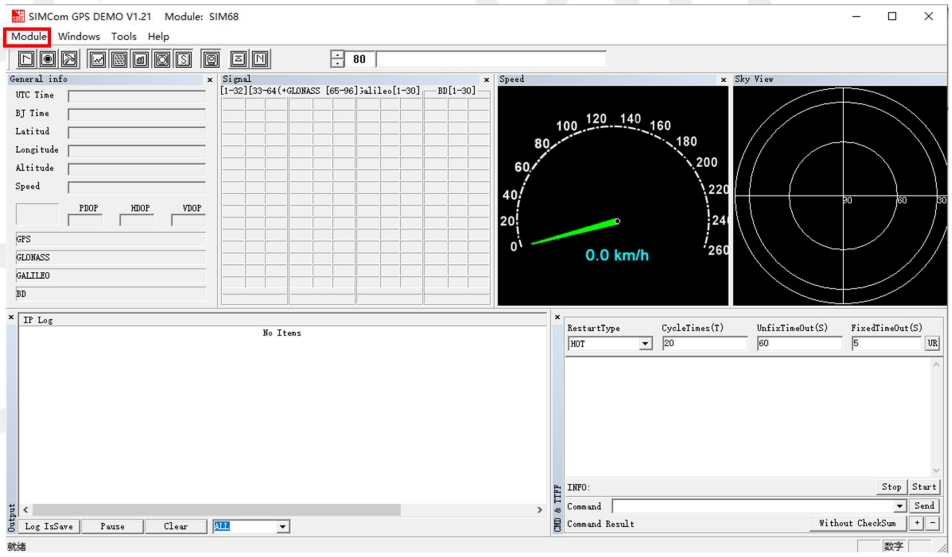

Figure 16: Testing tool interface

In the testing tool interface, open the “setting” window according to the following path: Module→Properties.
Interface setting procedure:

(1) Select the module:SIM68D;
(2) Select the NMEA COM:COM42;
(3) Select the baudrate:115200;
(4) Click OK .

The setting procedure is shown in the following figure.

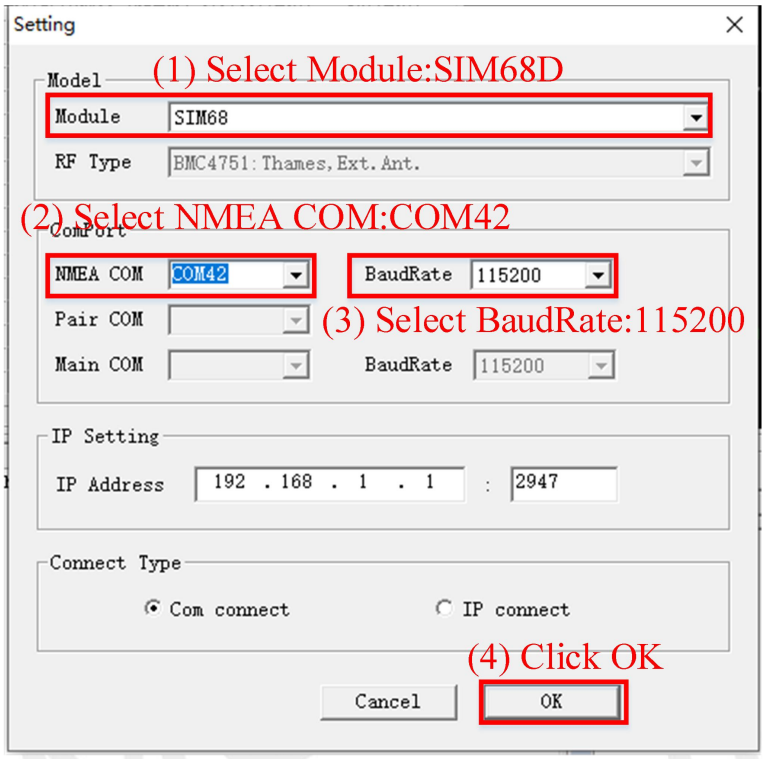

Figure 17: Setting Window

2.3.2 Click to RUN

Click the button “Run Comport” on the up left to run the module.

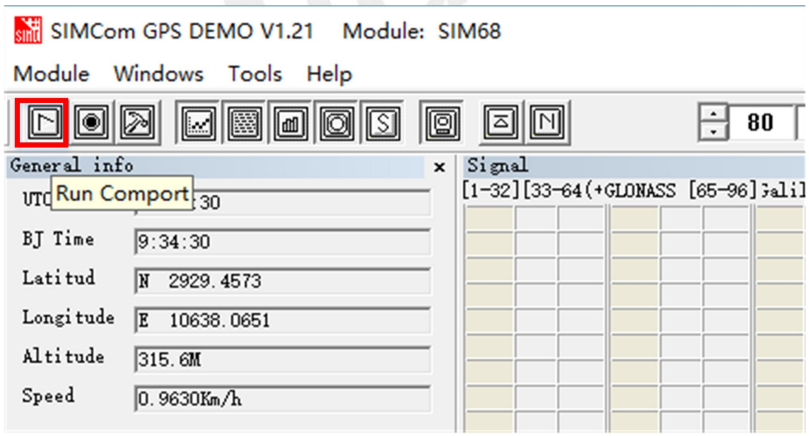

Figure 18: Click to Run

The module will run as the following figure.

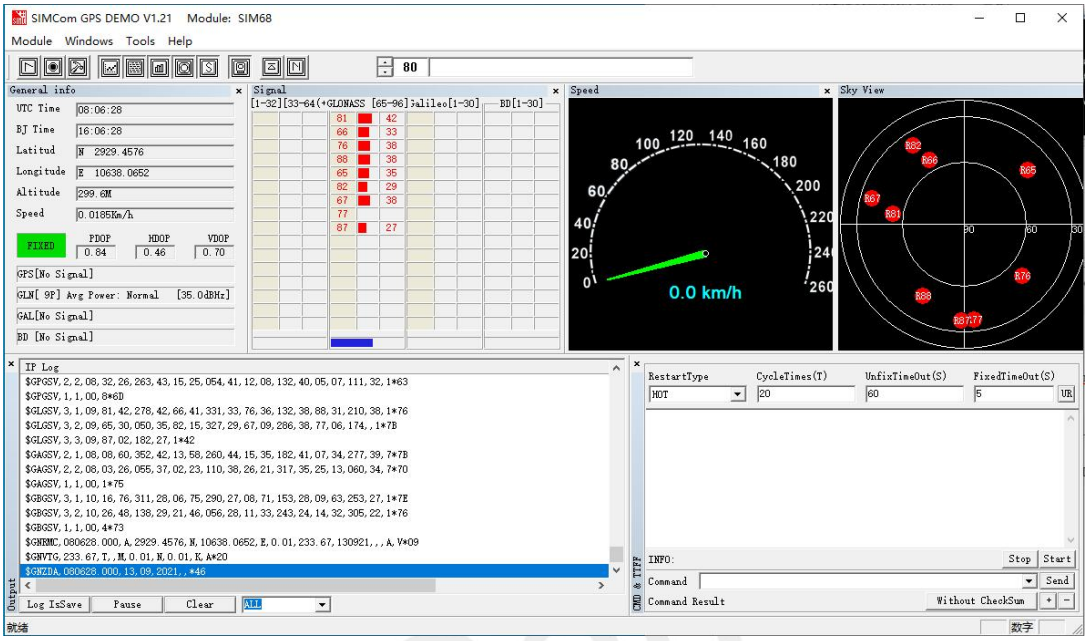

Figure 19: The module is running

2.4 Firmware Upgrade Process

Before upgrading the firmware, please contact the SIMCom technical support team and the supplier to obtain the correct download tool and firmware upgrade file.

The firmware update method of the module is shown below.

1. Insert the Micro USB into the USB connector J401 (AT/DL UART)

2. Open the “Airoha IoT Flash Tool” and follow the steps:

(1) Click the “Download” option;

(2) Select Enhanced port:COM42;

(3) Select “Config file”;

(4) Click the “Start” option;

(5) Push the “POWER_5V” S301 or push the “RESET” S101 on EVB board.

The firmware upgrade as shown in the figure 20.

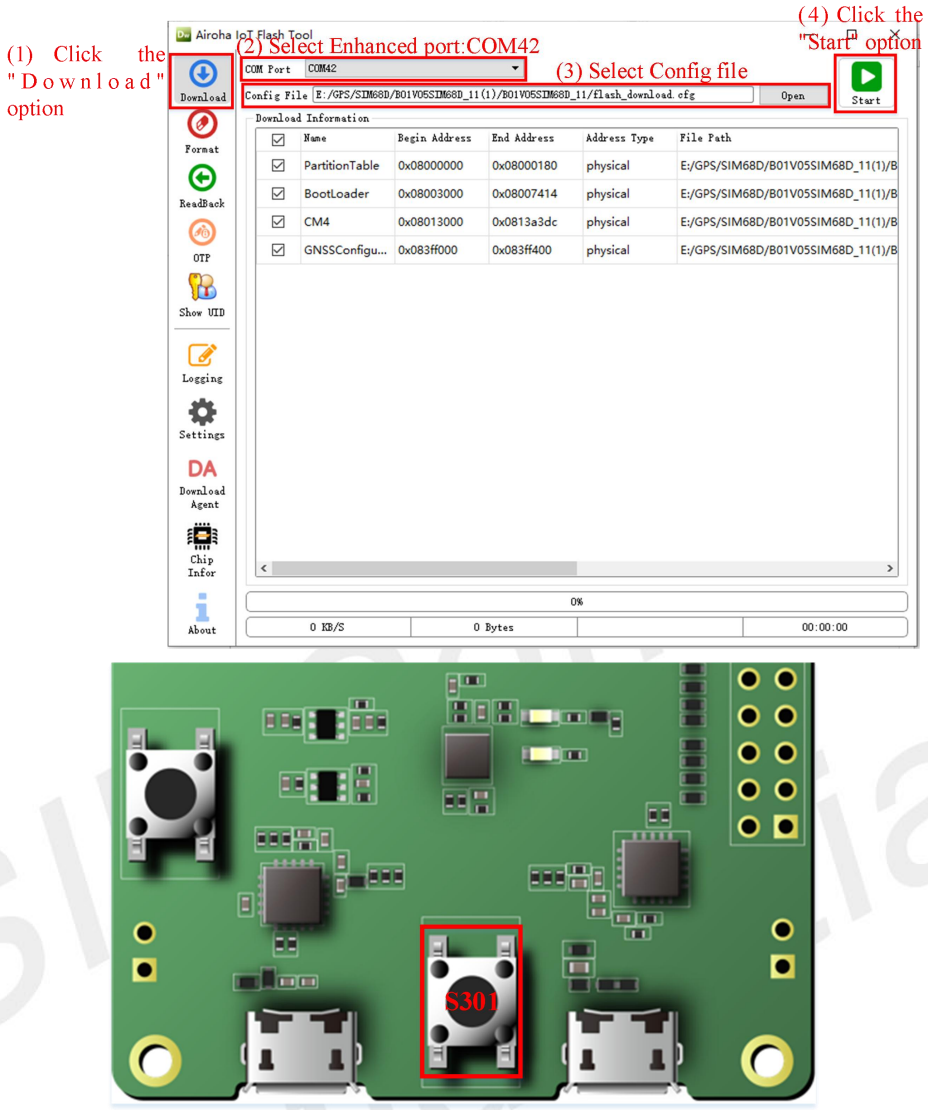

Figure 20: Download interface

3. Wait for a moment, and the download is successful as shown in Figure 21.

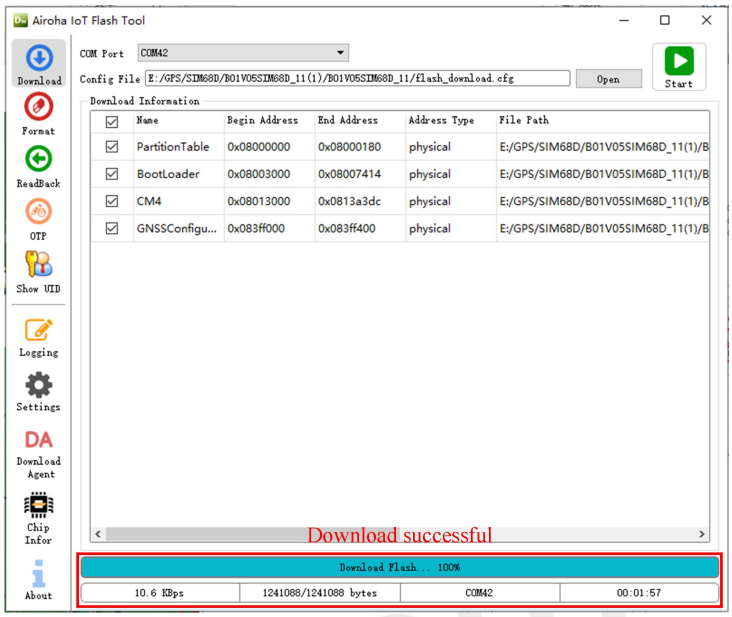

Figure 21: Download successful

2.5 PAIR Command Communication

PAIR commands currently have incomplete functions that need to be continuously updated after subsequent development. The content of this chapter is still being updated based on the actual debugging situation.

2.5.1 UART Serial Communication

The serial data frame format and serial baud rate of the SIM32ELA module are as follows.

1. Set the serial data frame format

SIM32ELA supports multiple serial data frame formats. The default data frame format is 8 data bits, 1 stop bit, and no parity bit.

Table 13: UART frame format

UART frame format	Supported formats
Data bit	8bit,7bit
Stop bit	1bit
Parity bit	Odd, Even, None

2. Set the serial port baud rate

SIM32ELA supports a variety of common baud rates. The factory default baud rate of the standard module is 115200, and it supports automatic baud rate adaptation. You can use $PAIR864 to set the baud rate.

Table 14: UART baud rate support

UART baud rate support	Supported rate
Serial communication baud rate	110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600, 3000000
Serial port adaptive baud rate	115200, 230400, 460800, 921600, 3000000

Common baud rate instructions for serial ports：

Table 15: UART common baud rate operations

UART common baud rate operations	Related instructions
Query the current baud rate	$PAIR865,0,0*31\r\n
Set the boot default baud rate	$PAIR864,0,0,115200*1B\r\n

3 Appendix

3.1 Reference Documents

Table 16: Reference documents

Number	File name	Describe
[1]	SIM32ELA Hardware Design	SIM32ELA Hardware Design Manual
[2]	SIM65M Series_NMEA Message_User Guide	SIM65M Command Manual

3.2 Terminology and Explanation

Table 17: Terminology and explanation

Terminology	Explanation
EVB	Evaluation Board
GSM	Global System for Mobile Communications
WCDMA	Wide band Code Division Multiple Access
LTE	Long Term Evolution
UART	Universal Asynchronous Receiver Transmitter
LED	Light Emitting Diode
NMEA	National Marine Electronics Association
NC	Not connect
GPS	Global Positioning System

3.3 Safety Warning

Table 18: Safety warning

Marks	Requirements
	When in a hospital or other health care facility, observe the restrictions about the use of mobiles. Switch the cellular terminal or mobile off, medical equipment may be sensitive and not operate normally due to RF energy interference.
	Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it is switched off. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. Forgetting to think much of these instructions may impact the flight safety, or offend local legal action, or both.
	Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.
	Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. RF interference can occur if it is used close to TV sets, radios, computers or other electric equipment.
	Road safety comes first! Do not use a hand-held cellular terminal or mobile when driving a vehicle, unless it is securely mounted in a holder for hands free operation. Before making a call with a hand-held terminal or mobile, park the vehicle.
	GSM cellular terminals or mobiles operate over radio frequency signals and cellular networks and cannot be guaranteed to connect in all conditions, especially with a mobile fee or an invalid SIM card. While you are in this condition and need emergent help, please remember to use emergency calls. In order to make or receive calls, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength. Some networks do not allow for emergency call if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may have to deactivate those features before you can make an emergency call. Also, some networks require that a valid SIM card be properly inserted in the cellular terminal or mobile.