



# SIM68D-EVB

## User Guide

GPS Module

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# 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 SIM68D 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	Two function indicator LED lights
Buttons	Two buttons for Exit_RTC/wake-up and download respectively

## 1.2 SIM68D-EVB Top and Bottom View

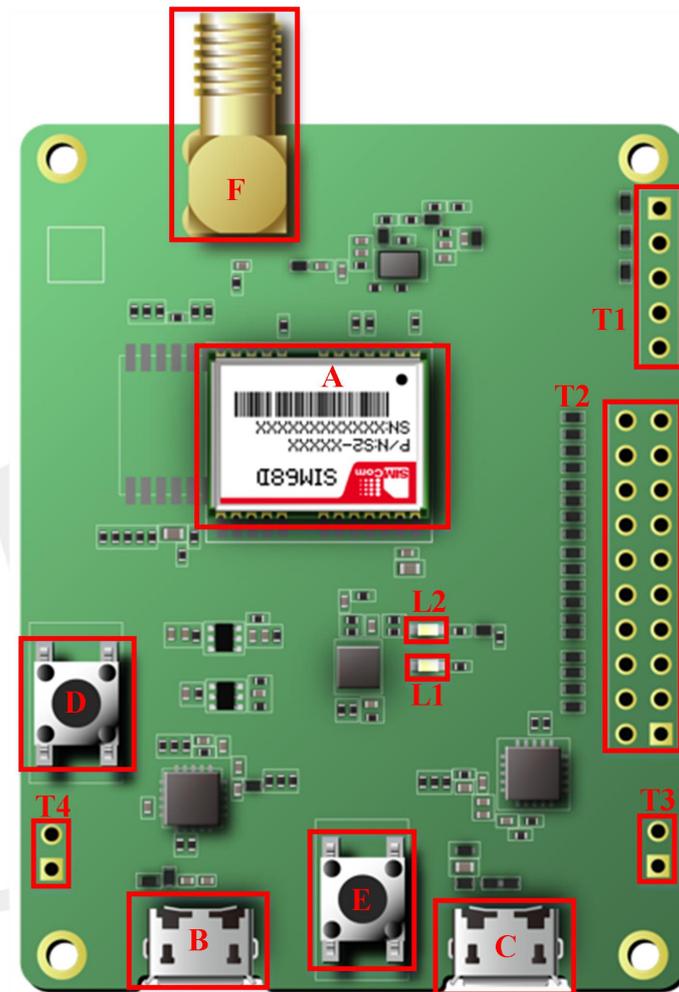


Figure 1: SIM68D-EVB top view

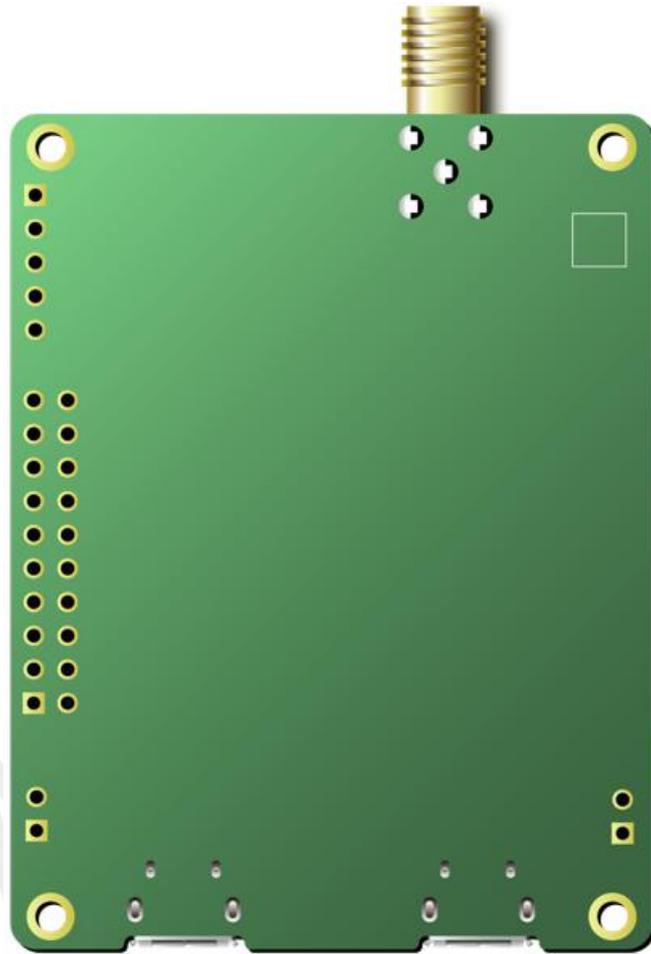


Figure 2: SIM68D-EVB bottom view

Table 2: Label information description

Label information	Description
A	SIM68D Module
B	Main serial port, used for AT commands and firmware upgrade
C	DBG serial port, used for system LOG capture
D	Exit_RTC/WAKEUP button
E	Download button
F	GNSS antenna connector
L1	Power indicator light
L2	PPS indicator light
T1,T2,T3,T4	Test point

### 1.3 SIM68D Evaluation Kit

Evaluation kit includes EVB board and other accessories.

The SIM68D kit list is as follows, please ensure that all kits are complete.

- 1) SIM68D-EVB board;
- 2) MICRO USB data cable;
- 3) GPS/ Beidou/Galileo/Glonass Ceramic Active Module Antenna;

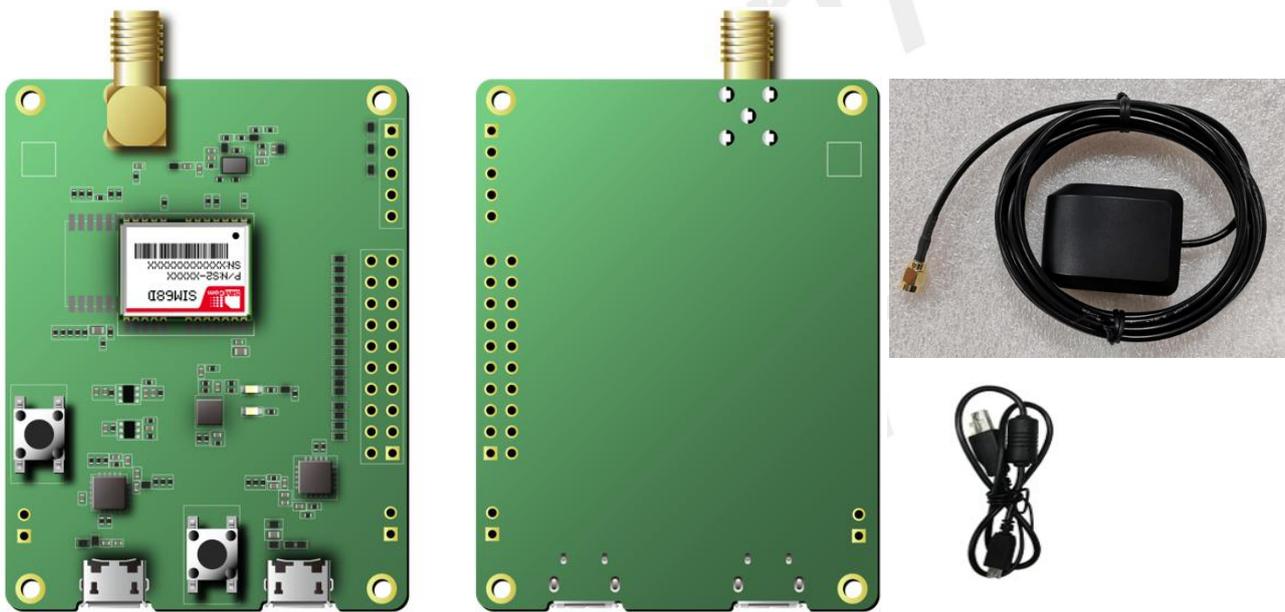


Figure 3: SIM68D Evaluation kit

**Table 3: EVB Kit**

EVB Kit	Description	quantity
SIM68D EVB	EVB board	1
Antenna	GPS/Beidou/Galileo/Glonass Ceramic Active Module Antenna	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 SIM68D EVB kit are shown in the table below.

**Table 4: EVB Kit**

EVB Kit	Part No
SIM68D EVB K	TBD

## 1.4 Interface Introduction

The interface of SIM68D 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: PPS signal indicator light
Buttons	S101	S101: Exit_RTC/Wake_UP button
	S301	S301: Download button
Test points	J102 J105 J301 J302	J301 J302: Power test point
		J102 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

SIM68D 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 SIM68D EVB is shown in the figure below.

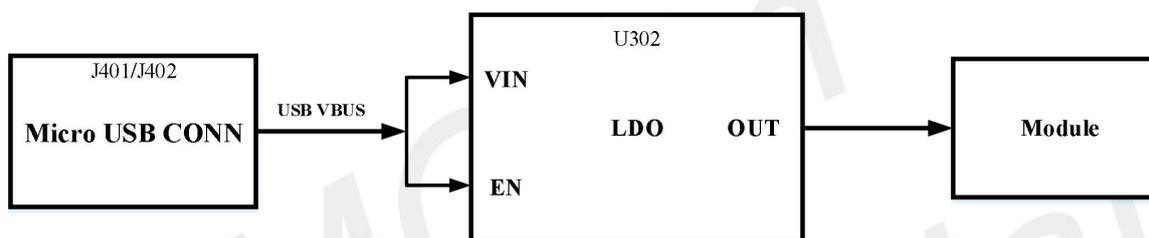


Figure 4: EVB Power supply block diagram

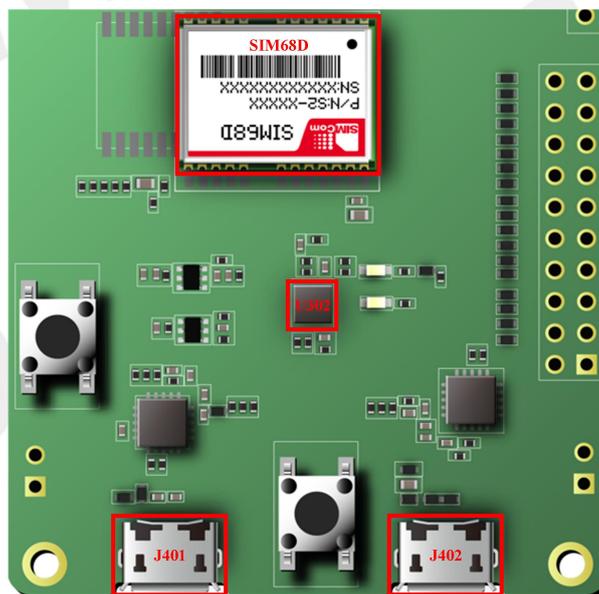
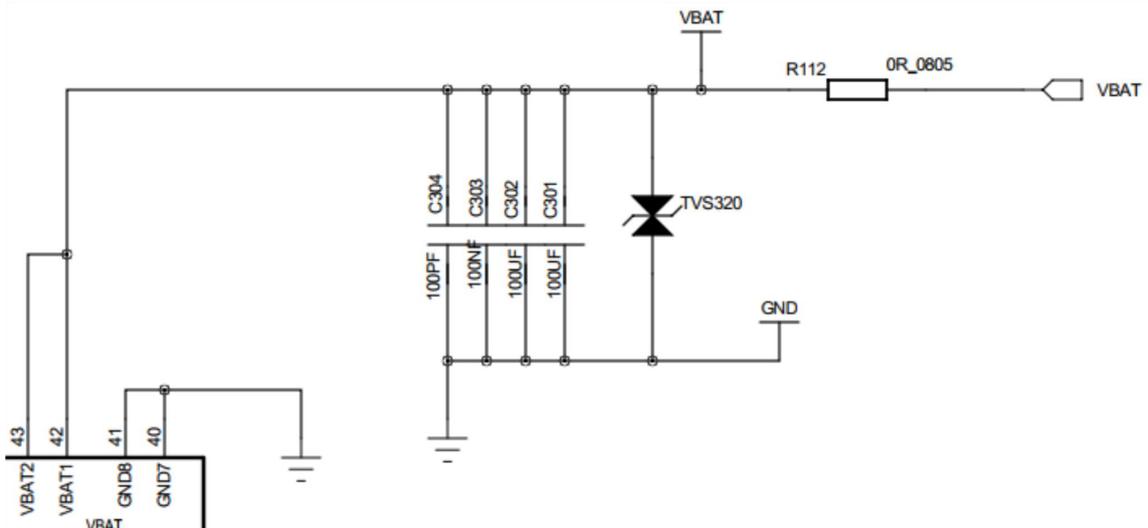


Figure 5: EVB power interface

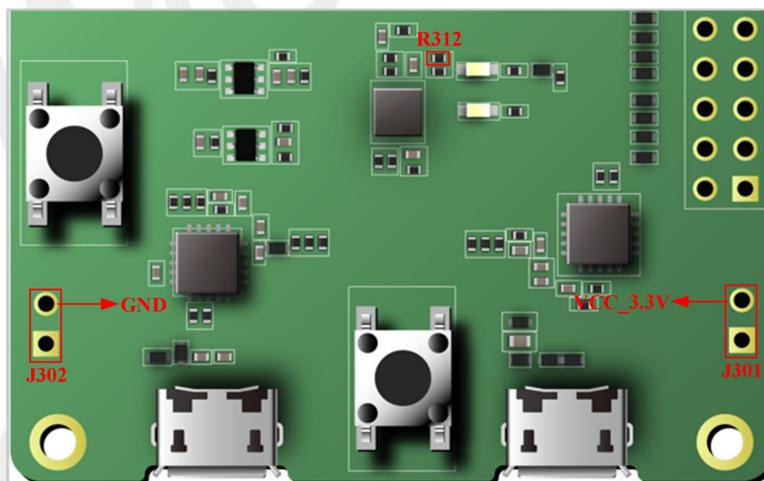
### 1.5.2 Separate Power Supply

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 resistance of R312 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 (VCC\_3.3V GND)**

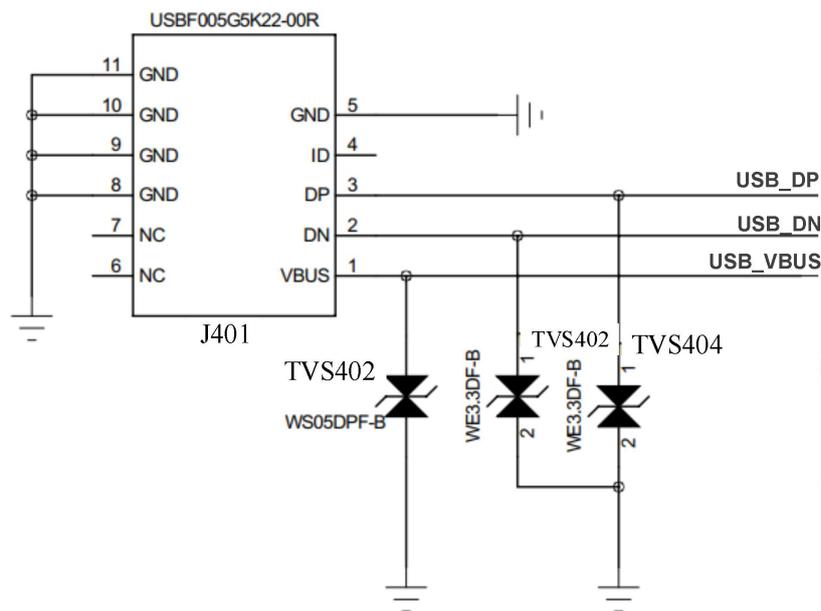
**Note**

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

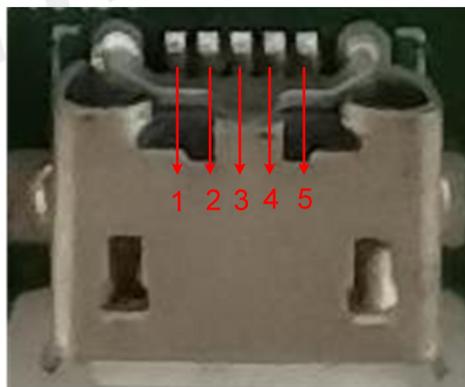
SIM68D EVB provides two UART interfaces (J401, J402) by USB to UART. The J401 provides the dual serial port: Enhanced COM Port and Standard COM Port, the dual serial port is used as the main serial port for AT commands, data transmission and firmware upgrade. And J402 is used as DEBUG debugging serial 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)**

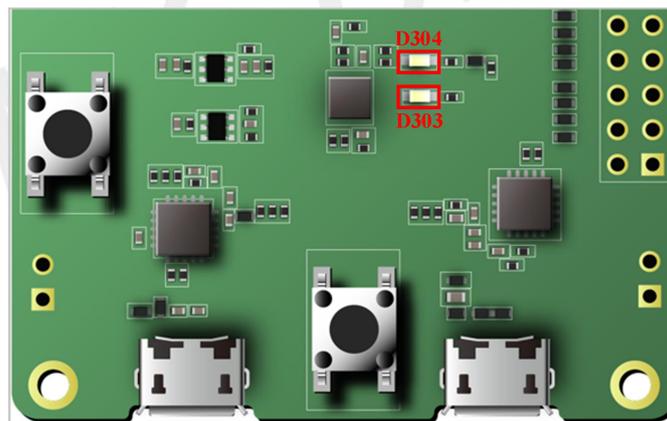
Pin number	Pin name	I/O	Description
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1	VBUS	O	USB power supply
2	USB_DM	I/O	USB differential data negative (USB-to-UART)
3	USB_DP	I/O	USB differential data positive (USB-to-UART)
4	\	\	Float
5	GND	\	Ground

## 1.7 Status Indicator Light

There are two status indicator lights D303 and D304 for function indication on SIM68D EVB.

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



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

**Table 7: Status indicator light description**

LEDs number	LEDs Colour	Description
D303	Red	Power status indicator light
D304	Blue	PPS signal indicator light

## 1.8 Buttons

There are two buttons (S101, S301) on SIM68D EVB.

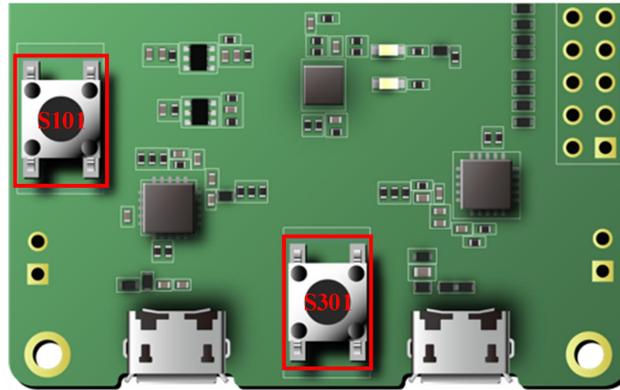


Figure 11: Buttons

Table 8: Buttons

Number	Name	Description
S101	Exit_RTC/WAKEUP	Module wake-up button
S301	DOWNLOAD	Firmware upgrade button

**Note**

1. Exiting RTC mode function is not currently supported.
2. To exit the sleep mode, you need to send the \$PAIR002\*38 command within 10ms of pressing the S101 button.

## 1.9 Test Points

There are four sets of test points J105、J301、J302 and J102 on SIM68D EVB. The details of the test points are as follows.

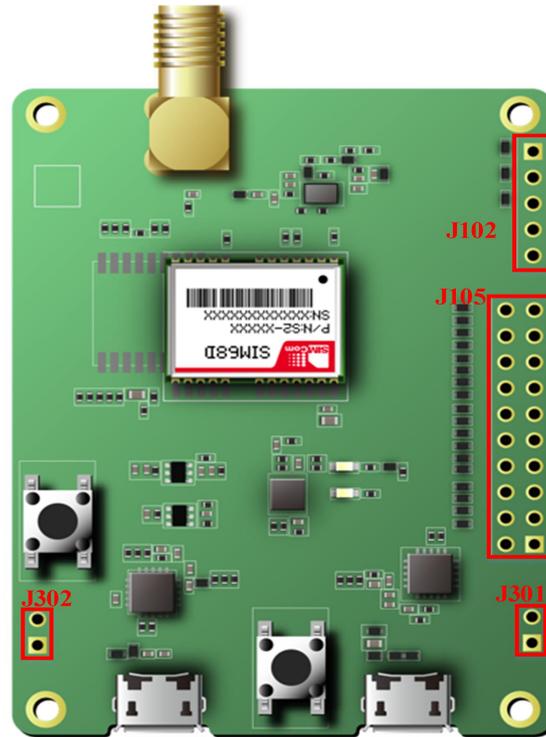


Figure 12: Test points location

The pin definition of position J102 is shown in the figure below.

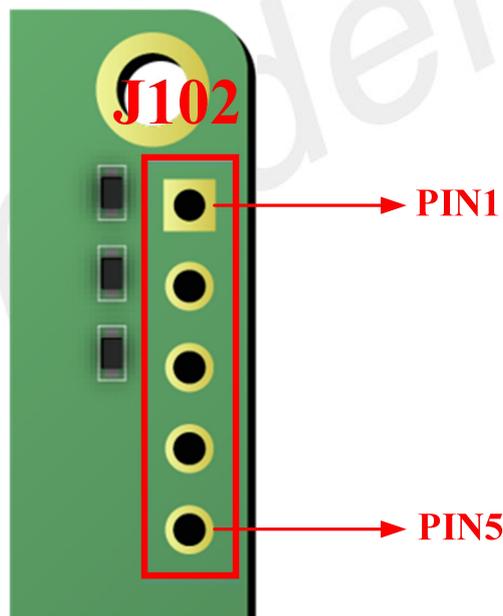


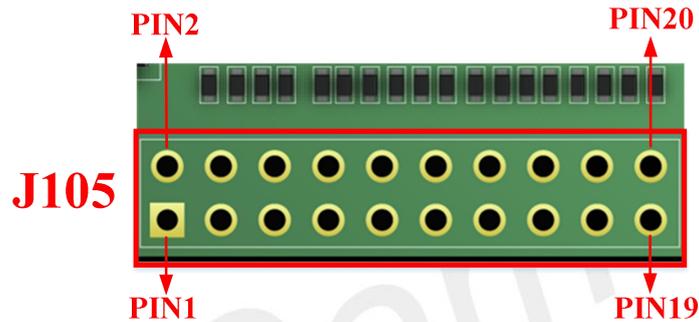
Figure 13: The pin definition of J102 on EVB

Table 9: Test point description of J102 on EVB

Position	Number	Name	Description
J102	J102_PIN1	I2C_CLK	I2C clock signal

J102_PIN2	I2C_DATA	I2C data signal
J102_PIN3	TIMER_FUNCTION	TIMER_FUNCTION outputs timing pulse related to receiver time
J102_PIN4	ANT_OFF	SIM66M antenna power supply control output
J102_PIN5	GND	Ground

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



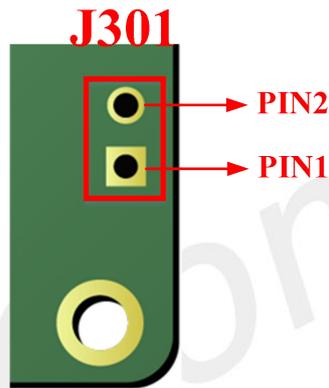
**Figure 14: Pin definition of location J105 on EVB**

**Table 10: Pin description of location J105 on EVB**

Position	Test point	Signal name	Description
J105	J105_PIN1	MOSI	SPI Master output signal
	J105_PIN2	VCC_3.3V	Module 3.3V power supply
	J105_PIN3	MISO	SPI Master input signal
	J105_PIN4	GND	Ground
	J105_PIN5	SCLK	SPI Clock output signal
	J105_PIN6	UART2_TX/SDA	RTCM function and NMEA serial output or I2C data signal
	J105_PIN7	SCS	SPI Chip select signal
	J105_PIN8	UART2_RX/SCL	RTCM function and NMEA serial input or I2C clock signal
	J105_PIN9	GND	Ground
	J105_PIN10	NRESET	SIM66M reset signal
	J105_PIN11	UART0_TX	NMEA serial output
	J105_PIN12	V_BACKUP	The backup battery input power supply for RTC
	J105_PIN13	UART0_RX	NMEA serial input
	J105_PIN14	VCC_RF_68D	SIM68D 2.8V output power supply for active antenna
	J105_PIN15	GPIO26	Module wake-up signal
	J105_PIN16	UART1_TX	System LOG serial output

J105_PIN17	EINT0	RTC interrupt , Exit RTC mode
J105_PIN18	UART1_RX	System LOG serial input
J105_PIN19	GPIO24	Host device wakeup the module from sleep mode, active high.
J105_PIN20	PPSO	PPS outputs timing pulse related to receiver time

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

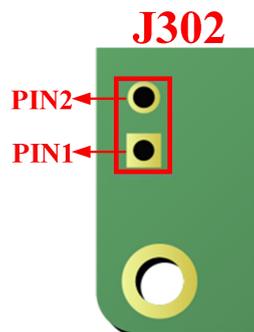


**Figure 15: The pin definition of J301 on EVB**

**Table 11: The pin description of J301 on EVB**

Position	Test point	Signal name	Description
J301	J301_PIN1	EXT_VBAT	EVB LDO power supply output voltage test point
	J106_PIN2	VCC_3V3	Module power input voltage test point

The pin definition of J302 is shown in the figure below.



**Figure 16: The pin definition of J302 on EVB**

**Table 12: The pin description of J302 on EVB**

Position	Test point	Signal name	Description
J302	J302_PIN1	5V	EVB 5V power supply test point

J302_PIN2	GND	GND
-----------	-----	-----

**※ Note**

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

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## 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-vcv-drivers>

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

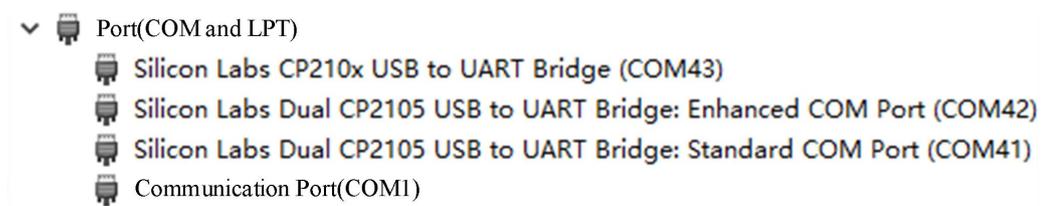


Figure 17: USB to UART ports

Table 13: 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	Used for AT communication, data transmission and firmware upgrade
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.

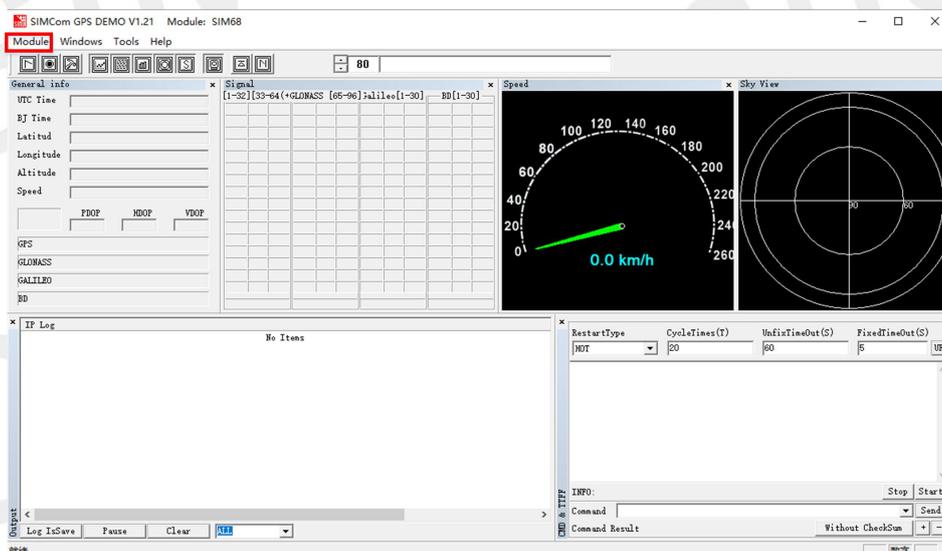


Figure 18: Testing tool interface

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.

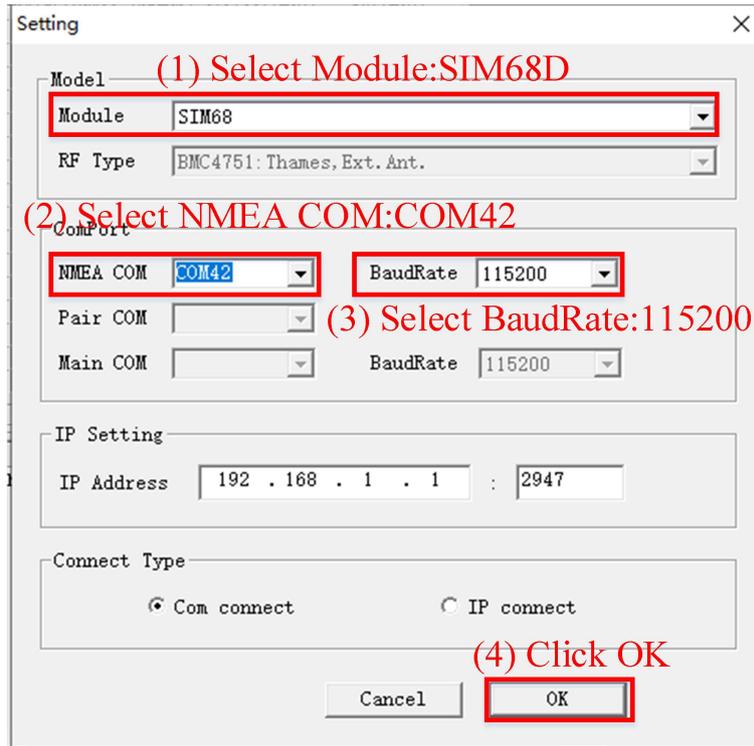


Figure 19: Setting Window

### 2.3.2 Click to RUN

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

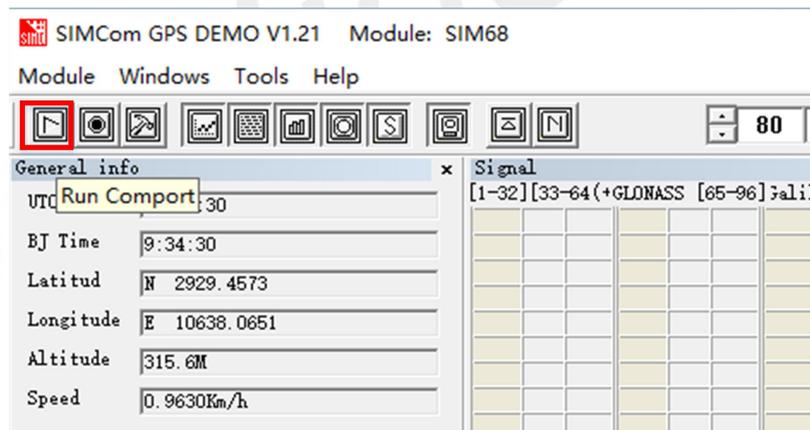


Figure 20: Click to Run

The module will run as the following figure.

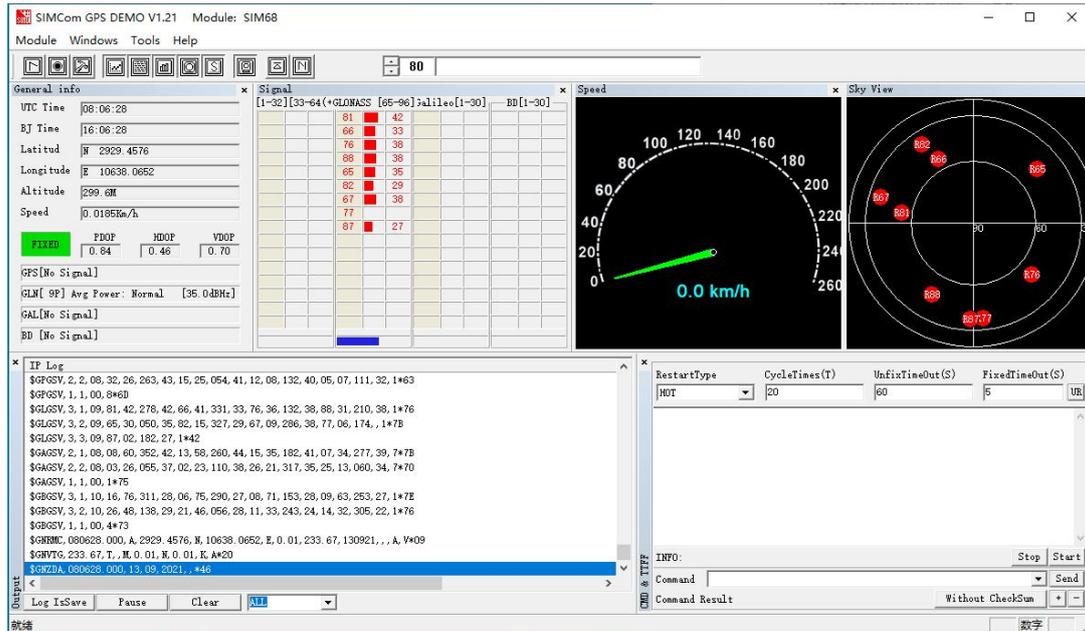


Figure 21: The module is running

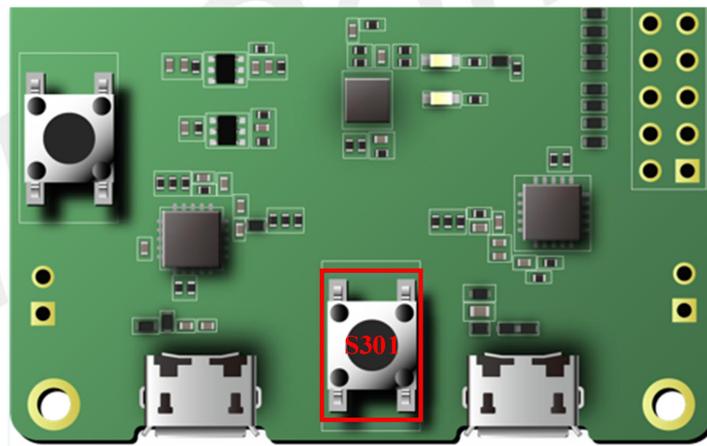
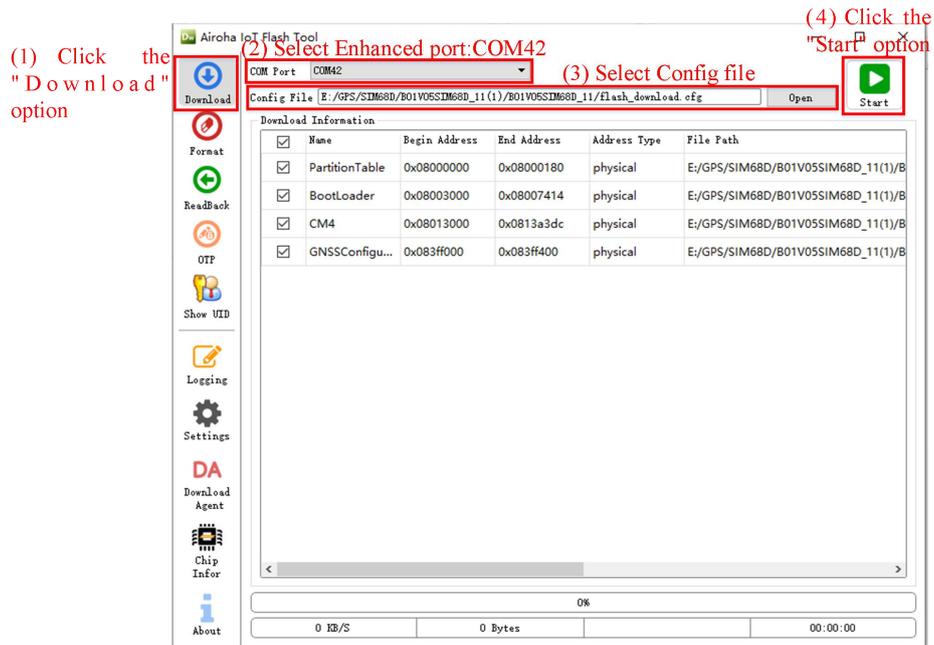
## 2.4 Firmware Upgrade Process

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 “DL button” S301 on EVB board.

The firmware upgrade as shown in the figure 22.



(5) Push the "DL button" S301 on EVB board

Figure 22: Download interface

3. Wait for a moment, and the download is successful as shown in Figure 23.

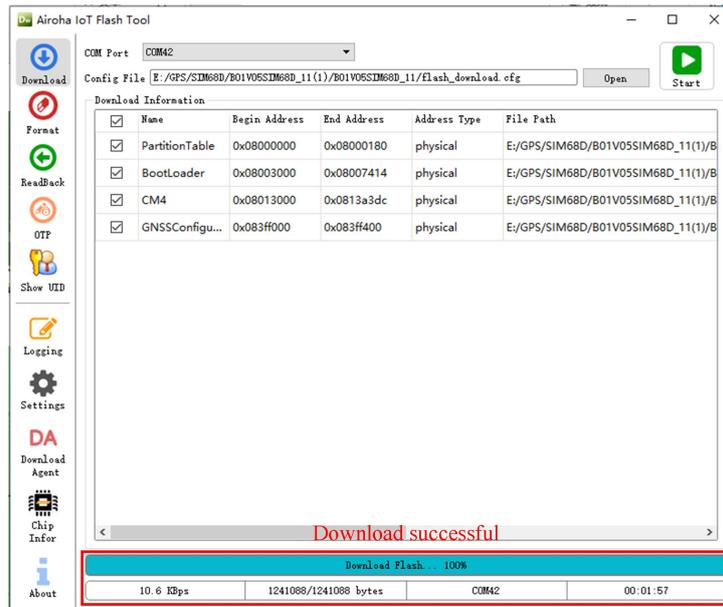


Figure 23: Download successful

## 2.5 AT Command Communication

AT 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 SIM68D module are as follows.

1. Set the serial data frame format

SIM68D supports multiple serial data frame formats. The default data frame format is 8 data bits, 1 stop bit, and no parity bit.

Table 14: 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

SIM68D 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 AT+IPR to set the baud rate.

**Table 15: UART baud rate support**

UART baud rate support	Supported rate
Serial communication baud rate	4800,9600,19200,38400,57600,115200,230400,460800,921600 230400,460800,921600
Serial port adaptive baud rate	4800,9600,19200,38400,57600,115200

Common baud rate instructions for serial ports:

**Table 16: UART common baud rate operations**

UART common baud rate operations	Related instructions
Query the current baud rate	AT+IPR?
Set the boot default baud rate	AT+IPR=
Set temporary baud rate to match automatically	AT+IPR=0

## 3 Appendix

### 3.1 Reference Documents

Table 17: Reference documents

Number	File name	Describe
[1]	SIM68D Hardware Design	SIM68D Hardware Design Manual
[2]	SIM68D Series_AT Command Manual	SIM68D AT Command Manual

### 3.2 Terminology and Explanation

Table 18: 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 19: 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.