SIM8200-M22 USB User Guidelines

5G Module

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Version History

Date	Version	Description of change	Author
2021-08-20	1.00	Initial version	Yao.chen

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1 Introduction

This document describes the interface and usage of the SIM8200-M22USB. With the help of this document, customers can quickly use the SIM8200-M22USB.

2 General Overview

2.1 Features Overview

Key features of SIM8200-M22USB are shown in the following table.

Table 1: Key features

Features	Implementation
M.2 interface	The SIM8200 M2 series(30mm*42mm or 30mm*52mm) module connector
Power supply	USB interface USB_VBUS 5V power supply PCIe interface VBAT_VPH 3.3V power supply
USB interface	M2 to USB interface
PCIe interface	M2 to mini PCIe interface
(U)SIM interfaces	Support 1 (U)SIM(6pin or 8pin) cards : dual voltage1.8V/3.0V
Signal indication	2 x LEDs are used for function indication
Test points	Function test points

2.2 Top and Bottom Views of the SIM8200-M22USB
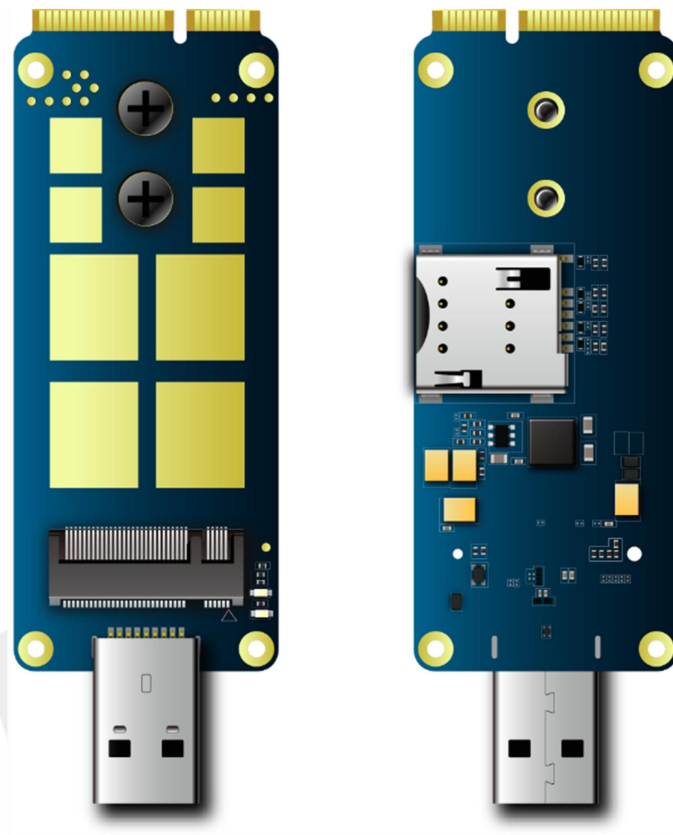
Figure 1: Top and bottom view of the SIM8200-M22USB

NOTE

Figure1 is the effect diagrams of the module, for reference only. Please refer to the actual product appearance.

2.3   SIM8200-M22USB-KIT

All accessories of the SIM8200-M22USB-KIT are shown in the follow figure. Please confirm all accessories are complete.

SIM8200-M22USB Borad
X 1

RF Antennas
X 4
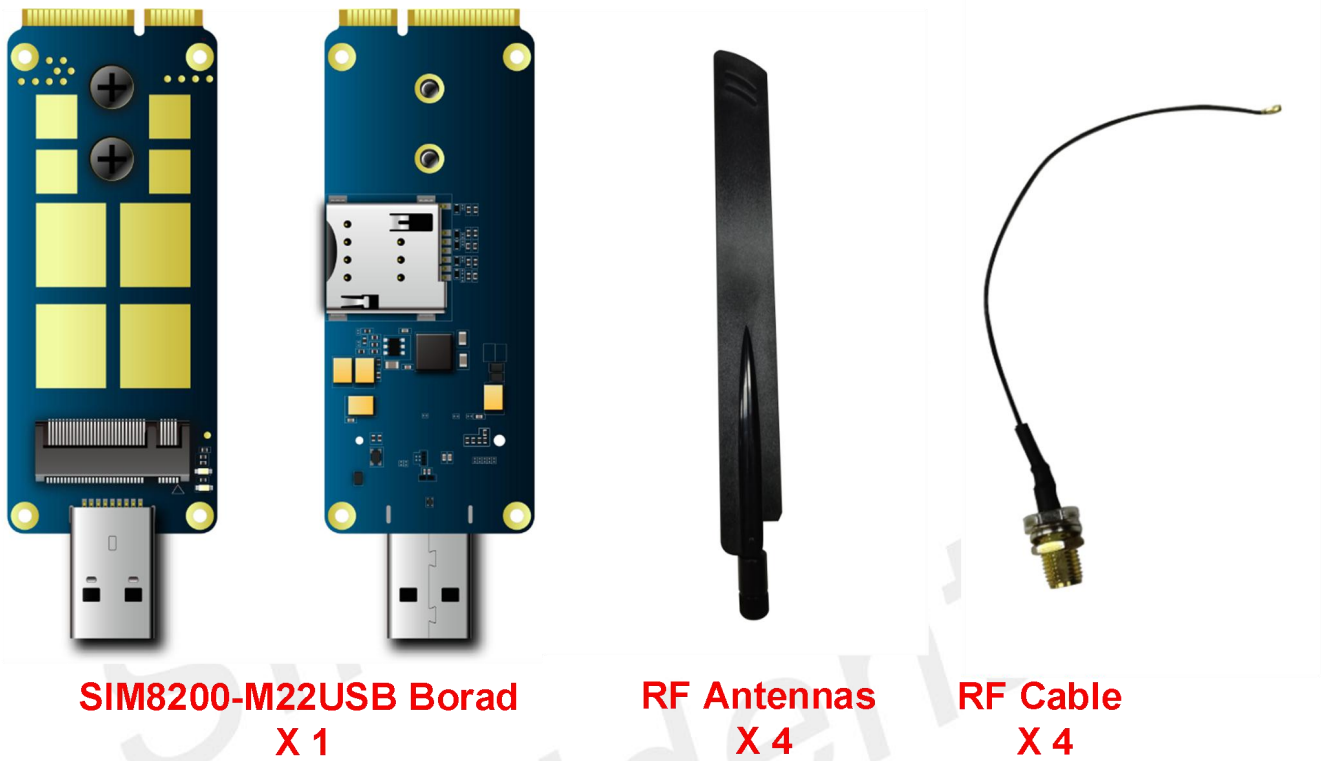
RF Cable
X 4

Figure 2: Accessories of the SIM8200-M22USB-KIT

Table 2: The SIM8200-M22USB-KIT list

Items	Description	Quantity
8XG000-SIM8200-M22USB	SIM8200-M22USB board	1
Cables	RF cable SMA-IPEX-4 DC-6GHZ	4
Antennas	RF antennas	4

Ensure the module normally use, it is recommended to use the correct kit model. The following table shows each kit part number.

Table 3: PN of SIM8200-M22USB-KIT

Kit	Part number
8XG000-SIM8200-M22USB-KIT	S2-10A44

3 Interface Introduction

3.1 M2 Interface

J401 connector is used to connecting SIM8200 M2 series module and SIM8200-M22USB board, the following figure shows M.2 interface position of the SIM8200-M22USB board.

Figure 3: M.2 interface of the SIM8200-M22USB board (J401)

3.2   Power Supply Interface

SIM8200-M22USB board has two power supply methods, if need use M2 to USB function, power supply by USB_VBUS net of USB interface, if need use M2 to PCIe function, power supply by VBAT net of PCIe interface.

The following figure is SIM8200-M22USB board power supply diagram.
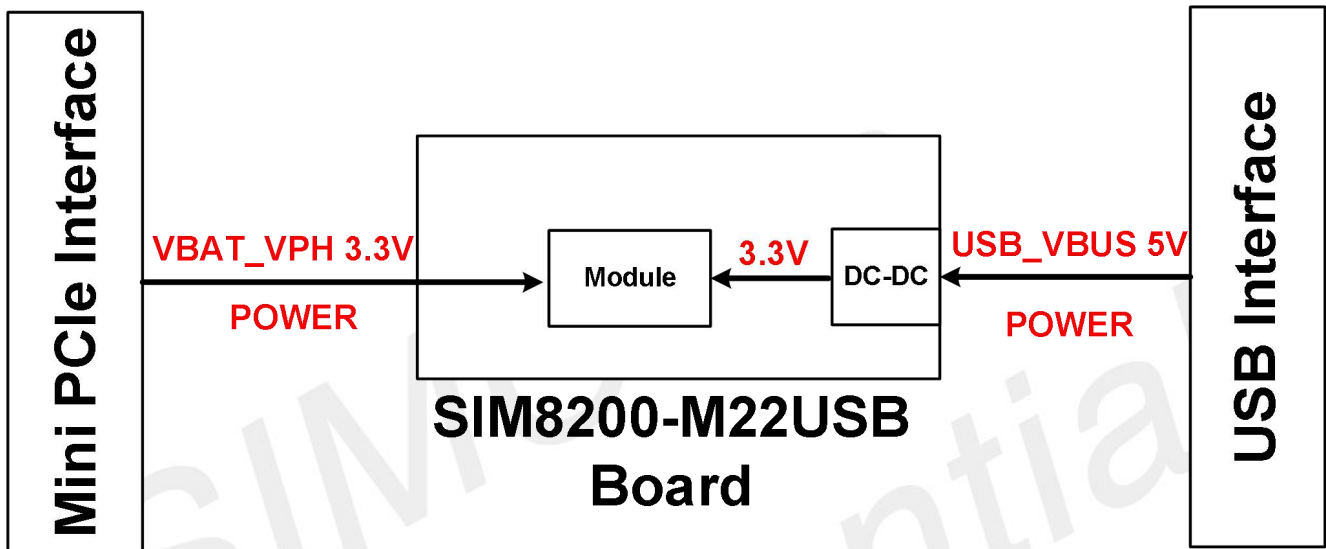
Figure 4: SIM8200-M22USB board power supply diagram

3.3 USB Interface

SIM8200-M22USB board support USB3.1 interface, which backward compatible with USB2.0 interface.

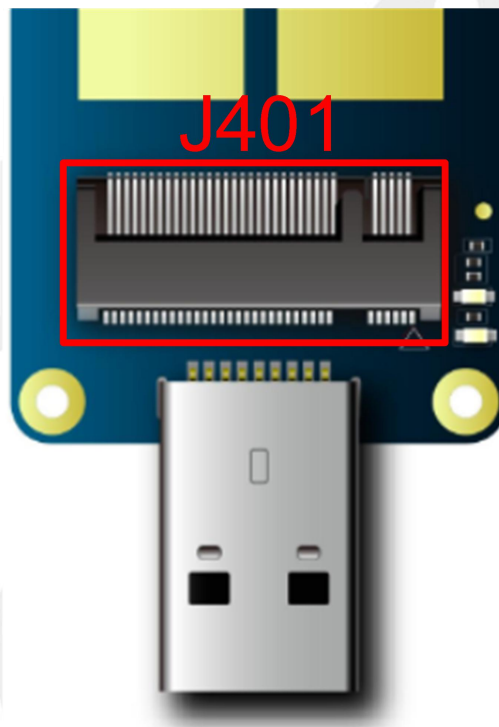The USB interface is used for AT command communication, data transmission, GNSS NMEA output, firmware update and software debugging.

The following figure shows the pin assignment of USB interface.
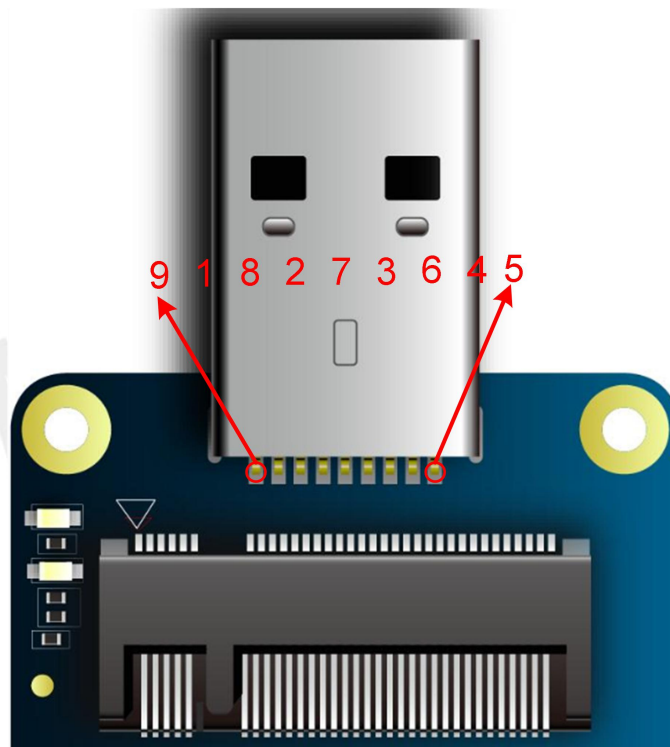
Figure 5: Pin assignment of USB interface (U101)

Table 4: Pin assignment of USB interface

Pin no.	Pin name	I/O	description
1	VBUS	O	USB 5V power supply
2	D-	I/O	Differential USB bi-directional data negative
3	D+	I/O	Differential USB bi-directional data positive
4	GND		Power Ground
5	SSRX-	I	USB3.1 receive data negative
6	SSRX+	I	USB3.1 receive data positive
7	GND_DRAIN		Signal Ground
8	SSTX-	O	USB3.1 transmit data negative
9	SSTX+	O	USB3.1 transmit data positive

3.4   PCIe Interface

SIM8200-M22USB board supports M2 to mini PCIe interface (52 pin), the following figure is pin assigment of mini PCIe interface.

51	I2S_WA(*W_DISABLE_2_N)
49	I2S_RX
47	I2S_TX
45	I2S_CLK
43	GND
41	VBAT_VPH(+3.3V)
39	VBAT_VPH(+3.3V)
37	GND
35	GND
33	PCIe_TX_P
31	PCIe_TX_N
29	GND
27	GND
25	PCIe_RX_P
23	PCIe_RX_N
21	GND
19	NC
17	NC
Mechanical Key	
15	GND
13	PCIe_CLK_P
11	PCIe_CLK_N
9	GND
7	PCIe_CLKREQ_N
5	COEX2(UART_RX)
3	COEX1(UART_TX)
1	PCIe_WAKE_N

PIN51 PIN52

PIN17 PIN18

PIN15 PIN16

PIN1 PIN2

52	VBAT_VPH(+3.3V)
50	GND
48	NC
46	NC
44	NC(*LED_1_N)
42	LED_1_N
40	GND
38	USB_D+
36	USB_D-
34	GND
32	I2C_SDA
30	I2C_SCL
28	NC
26	GND
24	VBAT_VPH(+3.3V)
22	PCIe_RESET_N
20	W_DISABLE_1_N
18	GND
Mechanical Key	
16	UIM1_DET
14	UIM1_RESET
12	UIM1_CLK
10	UIM1_DATA
8	UIM1_PWR
6	NC
4	GND
2	VBAT_VPH(+3.3V)

Figure 6: Pin assignment of mini PCIe interface

NOTE

1. "*" means the signal is compatible, but need to modify the hardware compatibility.
2. About PCIe interface of SIM8200-M22USB board more details, please contact SIMCom support teams.

3.5   (U)SIM Interface

SIM8200-M22USB board support SIM1 card, if need SIM1 card hot swap function, need to set AT commands "AT+UIMHOTSWAPON=1,1", "AT+UIMHOTSWAPLEVEL=1,1" and need close SIM2 card hot swap function "AT+UIMHOTSWAPON=0,2".
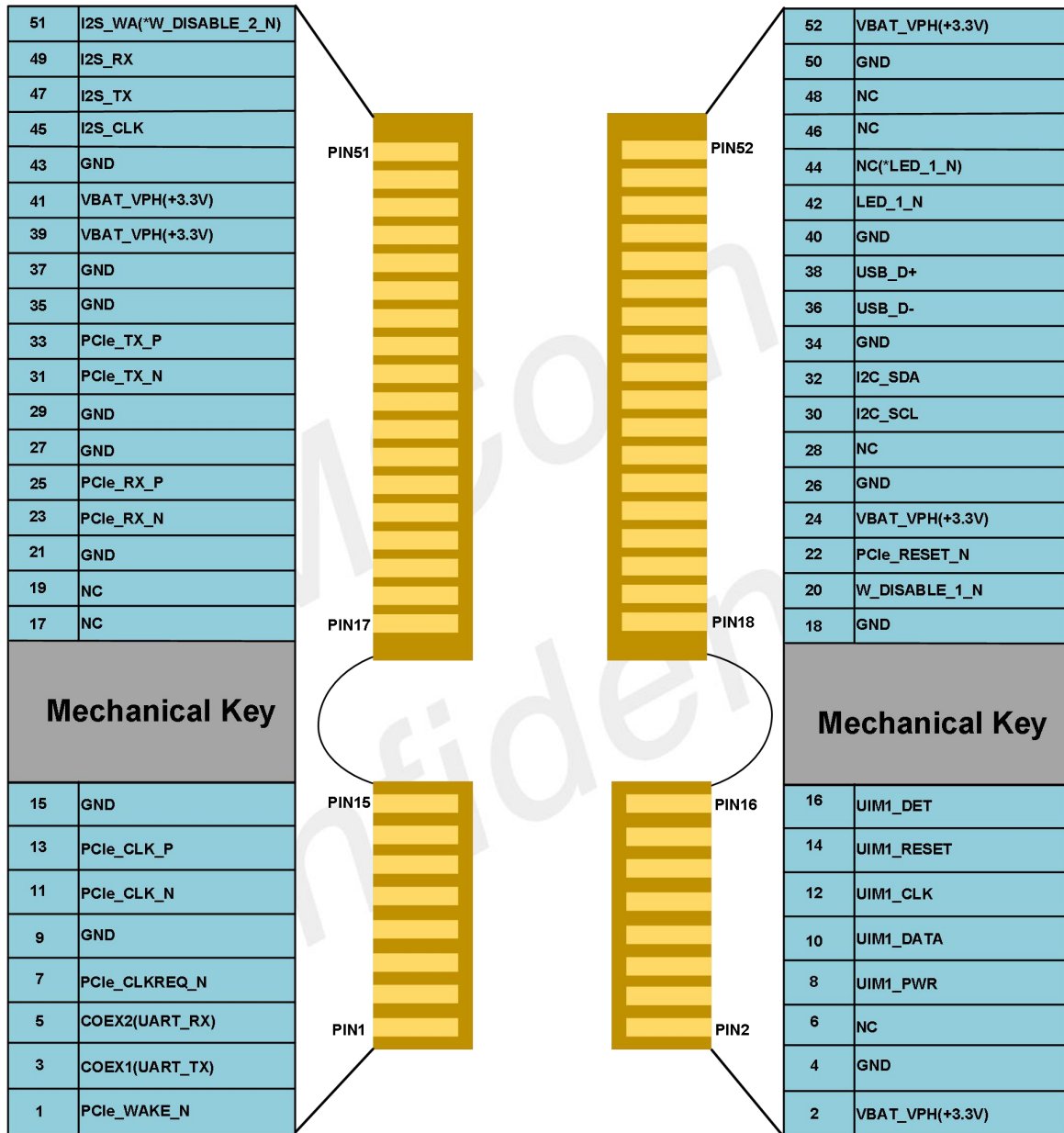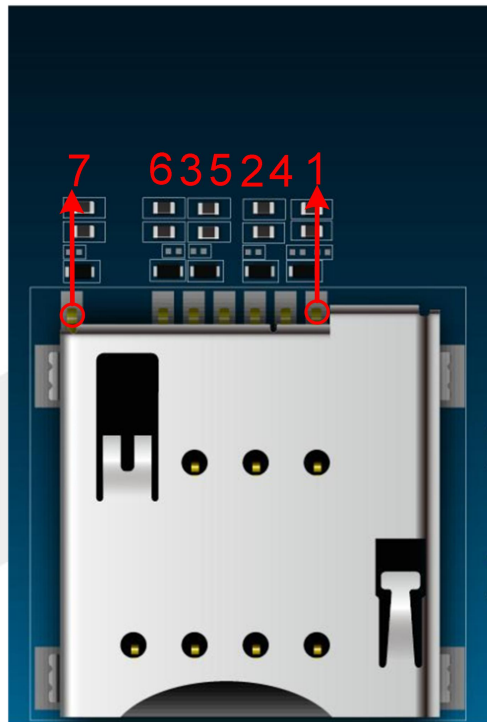

Figure 7: Pin assignment of (U)SIM1 card connector (J301)

Table 5: Pin assignment of (U)SIM1 interface

Pin no.	Pin name	I/O	Description
1	VCC	O	(U)SIM1 card power supply
2	RST	O	(U)SIM1 card reset signal
3	CLK	O	(U)SIM1 card clock signal
4	GND		Ground
5	VPP		Not connected
6	I/O	I/O	Bi-directional data line
7	DET	I	(U)SIM1 card detection

Using "AT+UIMHOTSWAPON=0 or 1" and "AT+UIMHOTSWAPLEVEL=0 or 1"AT command to set module SIM card hot swap function and SIM card detection level. For more (U)SIM card operation details, please refer to SIM8200 Series_AT Command Manual document.

3.6   Status Indication LEDs

There are 2 LED status indication lights on the SIM8200-M22USB board for the function indication.

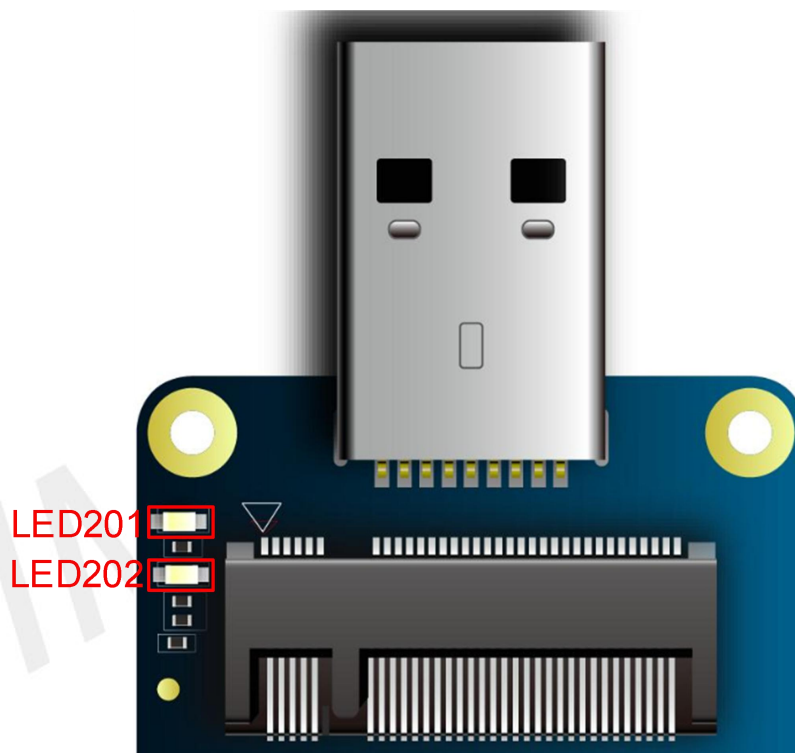The following figure is LED201 and LED202 status indication LEDs.

Figure 8: LED201 and LED202 status indication LEDs

Table 6: Description of module status indication LEDs

LEDs name	LEDs color	Description
LED201	Red	VBAT supply status indicator of the module
LED202	Red	The module register the network status indicator

3.7　Test Points of SIM8200-M22USB Board

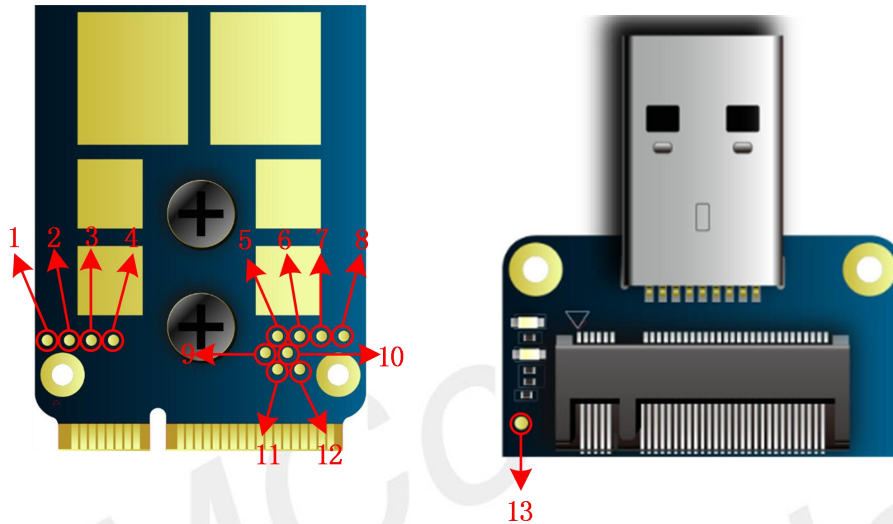The following figure is test points of the SIM8200-M22USB board.

Figure 9: Test points of SIM8200-M22USB board

Table 7: Test points of SIM8200-M22USB board

Number	Name	Description
1	WOWWAN	Interrupt output signal of the module
2	DPR	DPR (Dynamic Power Reduction) signal
3	2_N	GNSS enable signal(Active low)
4	1_N	RF enable signal(Active low)
5	DATA	RFFE0_DATA signal
6	CTRL0	GPIO control signal 0
7	TESET	Reset signal of module(Active low)
8	CTRL3	GPIO control signal 3
9	CLK	RFFE0_CLK signal
10	CTRL1	GPIO control signal 1
11	MCLK(IO)	I2S MCLK clock signal
12	CTRL2	GPIO control signal 2
13	P-KEY[1]	Power-On signal of module(HIGH : Power on, LOW : Power off)

NOTE

1. P-KEY test point only as test point, because P-KEY signal pull up VBAT_PWR by 100K resister on SIM8200-M22USB board.

4 Appendix

4.1 Related Documents

Table 8: Related documents

No.	Title	Description
[1]	SIM8200 Series_AT Command Manual	AT Command Manual
[2]	SIM8200EA-M2-ANT6 Hardware Design	SIM8200EA-M2-ANT6 HD document
[3]	SIM8200EA-M2-ANT4 Hardware Design	SIM8200EA-M2-ANT4 HD document
[4]	SIM8202G-M2 Hardware Design	SIM8202G-M2 HD document
[5]	SIM8300G-M2 Hardware Design	SIM8300-M2 HD document
[6]	SIM8210C-M2 Hardware Design	SIM8210C-M2 HD document
[7]	SIM8202E-M2 Hardware Design	SIM8202E-M2 HD document

4.2 Terms and Abbreviations

Table 9: Terms and abbreviations

Abbreviation	Description
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
I2C	Inter-Integrated Circuit
I2S	Inter-IC Sound
IMEI	International Mobile Equipment Identity
MSB	Most Significant Bit
PCB	Printed Circuit Board
PCIe	Peripheral Component Interface Express
RF	Radio Frequency
SIM	Subscriber Identification Module
SMPS	Switched-Mode Power Supply
NC	Not connect
(U)SIM	Universal Subscriber Identity Module
UART	Universal Asynchronous Receiver Transmitter

4.3 Safety Caution

Table 10: Safety caution

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.
SOS	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.