5G-M2 EVB
User Guide

5G Module Series

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The following safety precautions must be observed during all phases of operation, such as usage, service or repair of any terminal or mobile incorporating the module. Manufacturers of the terminal should notify users and operating personnel of the following safety information by incorporating these guidelines into all manuals of the product. Otherwise, Quectel assumes no liability for customers' failure to comply with these precautions.

	Full attention must be paid 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 terminal or mobile before boarding an aircraft. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. If there is an Airplane Mode, it should be enabled prior to boarding an aircraft. Please consult the airline staff for more restrictions on the use of wireless devices on an 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.
SOS	Terminals or mobiles operating over radio signal and cellular network cannot be guaranteed to connect in certain conditions, such as when the mobile bill is unpaid or the (U)SIM card is invalid. When emergency help is needed in such conditions, use emergency call if the device supports it. In order to make or receive a call, the terminal or mobile must be switched on in a service area with adequate cellular signal strength. In an emergency, the device with emergency call function cannot be used as the only contact method considering network connection cannot be guaranteed under all circumstances.
	The terminal or mobile contains a transceiver. When it is ON, it receives and transmits radio frequency signals. RF interference can occur if it is used close to TV sets, radios, computers or other electric equipment.
	In locations with explosive or potentially explosive atmospheres, obey all posted signs and turn off wireless devices such as mobile phone or other terminals. Areas with explosive or potentially explosive atmospheres include fueling areas, below decks on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles such as grain, dust or metal powders.

About the Document

Revision History

Version	Date	Author	Description
-	2021-10-11	Royd WEI	Creation of the document
1.0	2021-11-18	Kingson ZHANG	First official release
1.1.0	2023-07-17	Soley ZHANG	1. Updated 5G-M.2 EVB board version from V1.2 to V1.3 and its related information. 2. Added communication via PCIe interface (Chapter 5.4).

Contents

Table Index

Figure Index

1 Introduction

This user guide describes the application details of 5G-M2 EVB (evaluation board), which is an assistant tool for developers to develop applications and test basic functionalities of applicable modules.

1.1. Applicable Modules

For details about the applicable modules of this EVB, see *document [1]*.

1.2. Special Mark

Table 1: Special Mark

Mark	Definition
*	Unless otherwise specified, when an asterisk (*) is used after a function, feature, interface, pin name, AT command, or argument, it indicates that the function, feature, interface, pin, AT command, or argument is under development and currently not supported; and the asterisk (*) after a model indicates that the sample of such model is currently unavailable.

2 Product Overview

2.1. Top View

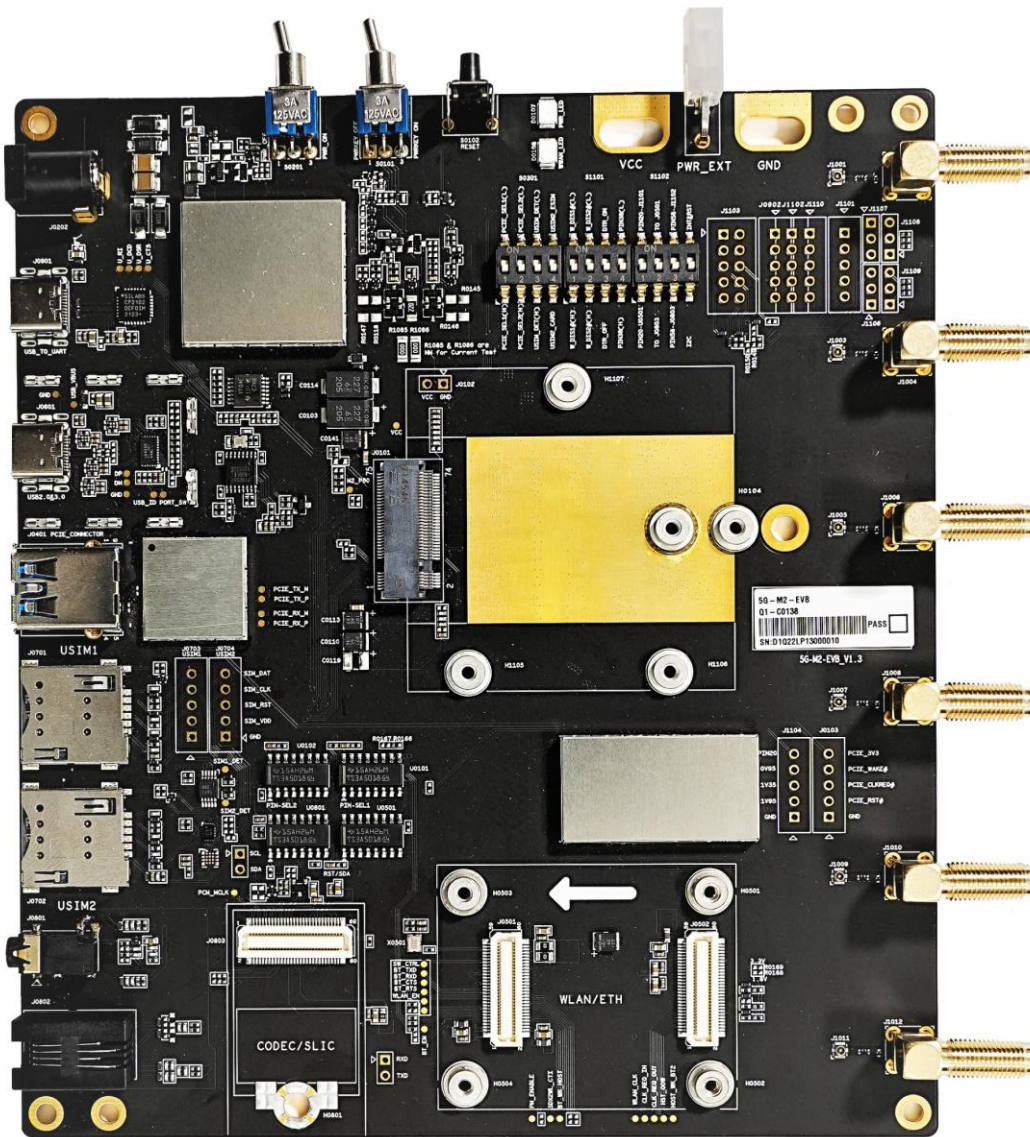The size of 5G-M2 EVB is 168 mm × 146 mm, and the top view is shown as below:

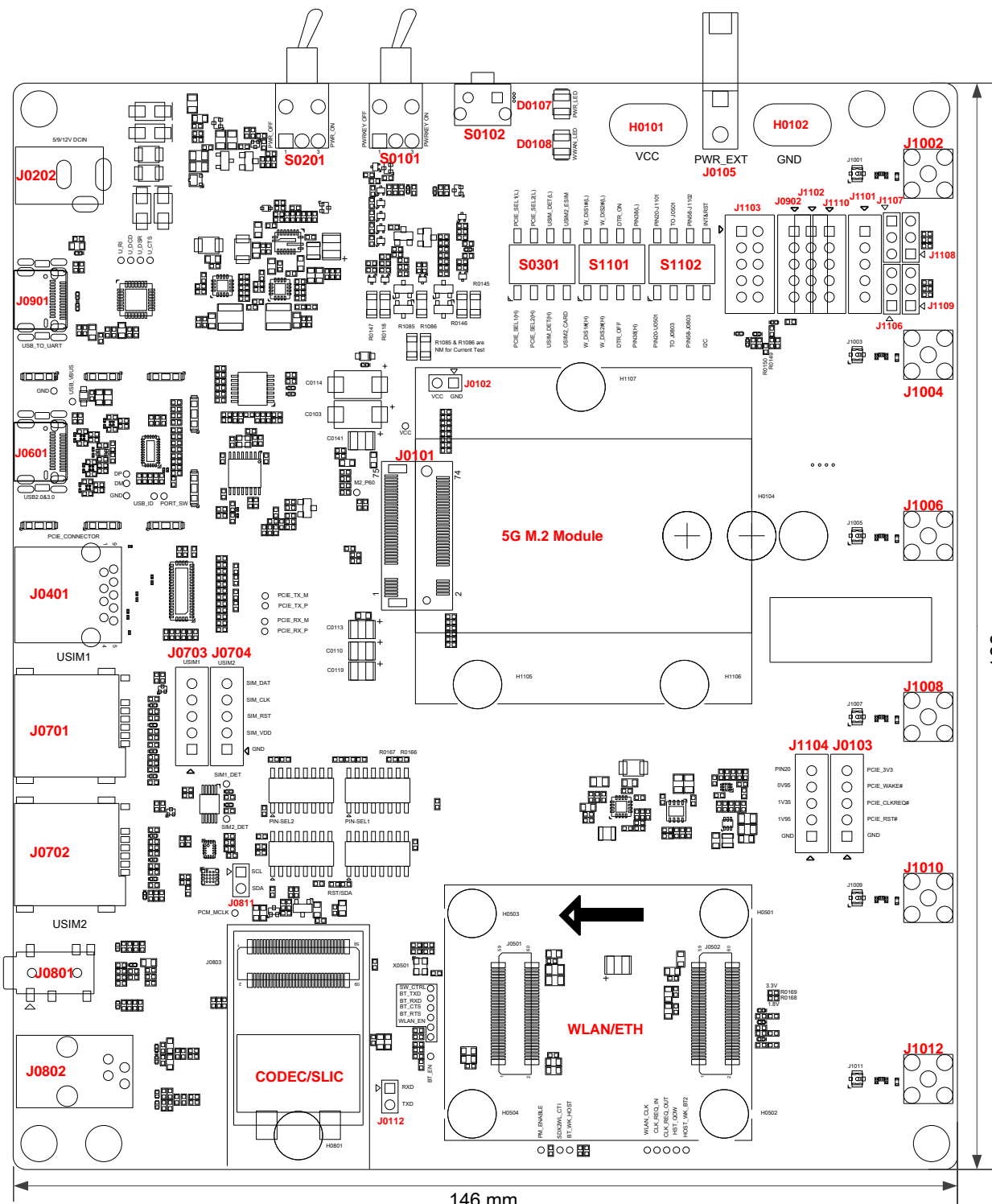**Figure 1: Top View of 5G-M2 EVB**

2.2. Component Placement

Figure 2: Top View for Component Placement

Table 2: Components & Functions

Component	RefDes.	Description	Comment
Power Supply	J0202	Power jack on the EVB	● DC power supply: 5 /9 /12 V ● Typical supply power: +5 V/ 3 A
	J0601	USB Type-C connector	Typical supply power: +5 V/ 3 A
	J0901	USB Type-C connector	Typical supply power: +5 V/ 3 A
	J0105	External power connector	Used for configuration of limiting voltage
	H0101/ H0102	Current test hole/GND	Used for testing power consumption of the module
Power Switch	S0201	● Power on/off the EVB ● Switch	
PWRKEY	S0101	● Power key ● Turn on/off the module ● Switch	
RESET	S0102	● Reset button ● Used to reset the module	
M.2 Interface	J0101	M.2 connector for the module	Standard PCI Express M.2 interface
USB Interface	J0601	USB Type-C connector	Used for USB 3.1/3.0 and USB 2.0 communication
USB-to-UART	J0901	USB Type-C connector	Used to convert debug UART to USB 2.0 signal
	J0902	Test points	Used to connect the module's DBG_TXD and DBG_RXD to the EVB
PCIe-to-USB	J0401	USB Type-A connector	PCIe-to-USB interface
WLAN/Ethernet Interfaces	J0501, J0502	BTB connector	Supports WLAN or RTL8111H/RTL8125 Ethernet
Audio Interfaces	J0803	Codec board TE-A connector	Supports ALC5686 codec board or LE9643 SLIC board
	J0801	Audio jack for earphone	● 3.5 mm earphone interface ● Used to test the analog audio function of codec modules
	J0802	Designed for headset	● RJ11-4P handset interface ● Used to test the analog audio function of SLIC modules
(U)SIM Card Interfaces	J0701	(U)SIM1 card connector	● Supports (U)SIM card insertion detection
	J0702	(U)SIM2 card connector	● Class B (3.0 V) and Class C (1.8 V)

Status Indicators	D0107	Power supply indicator (PWR_LED)	2 LEDs available for signal indication
	D0108	RF status indicator (WWAN_LED)	
Antenna Interfaces	J1002, J1004, J1006, J1008, J1010, J1012	Antenna connectors	6 antennas supporting 600–6000 MHz
Test Points	J0102, J0103, J0112, J0703, J0704, J0811, J0903, J1101, J1102, J1103, J1104, J1106, J1107, J1108, J1109, J1110		16 test points

3 Kit Accessories & Assembly

3.1. Accessories Assembly
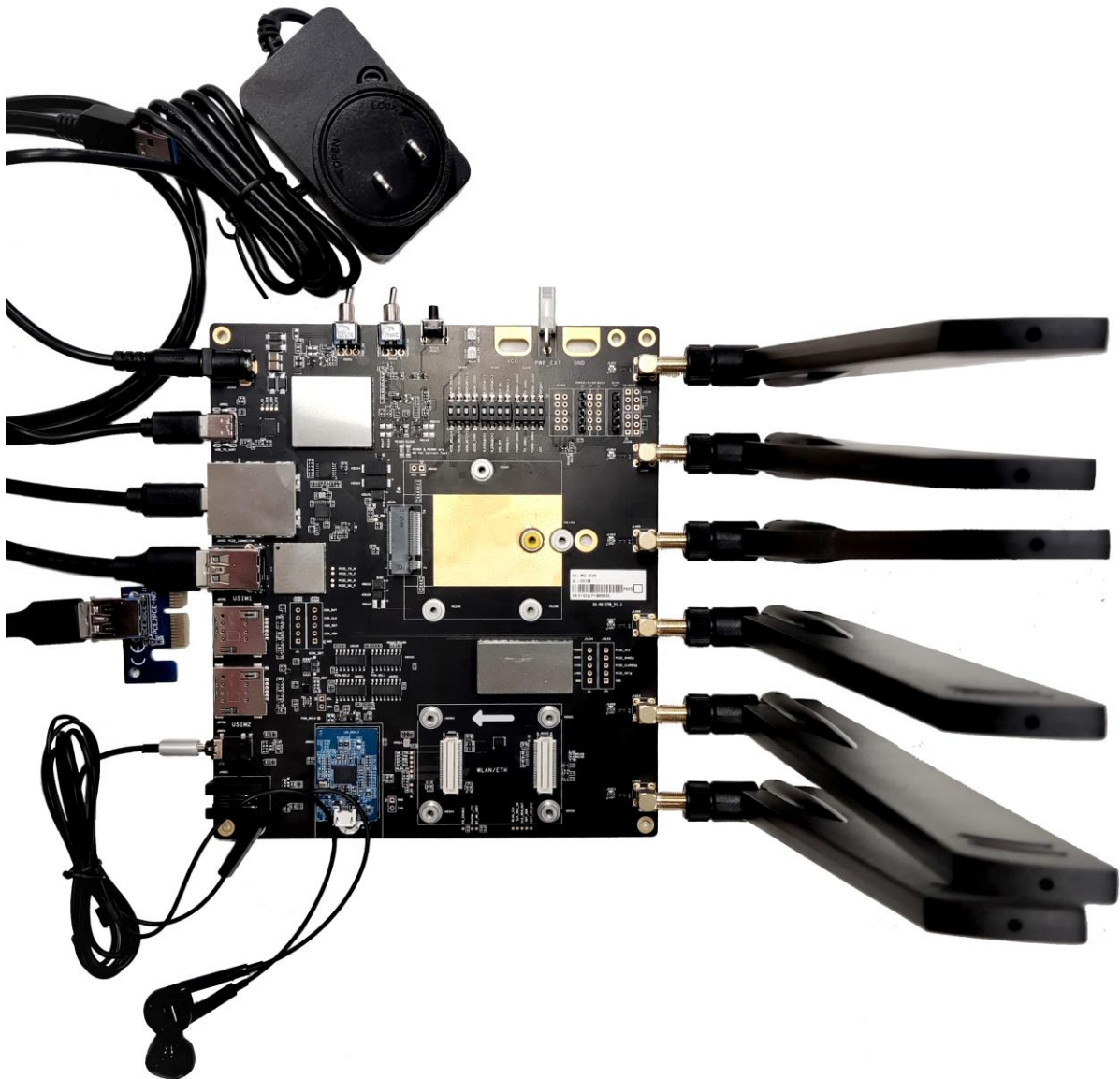
Figure 3: 5G-M2 EVB and Accessories Assembly

3.2. Accessories List

All accessories of the 5G-M2 EVB kit are listed as below. Please contact the supplier if there is something missing.
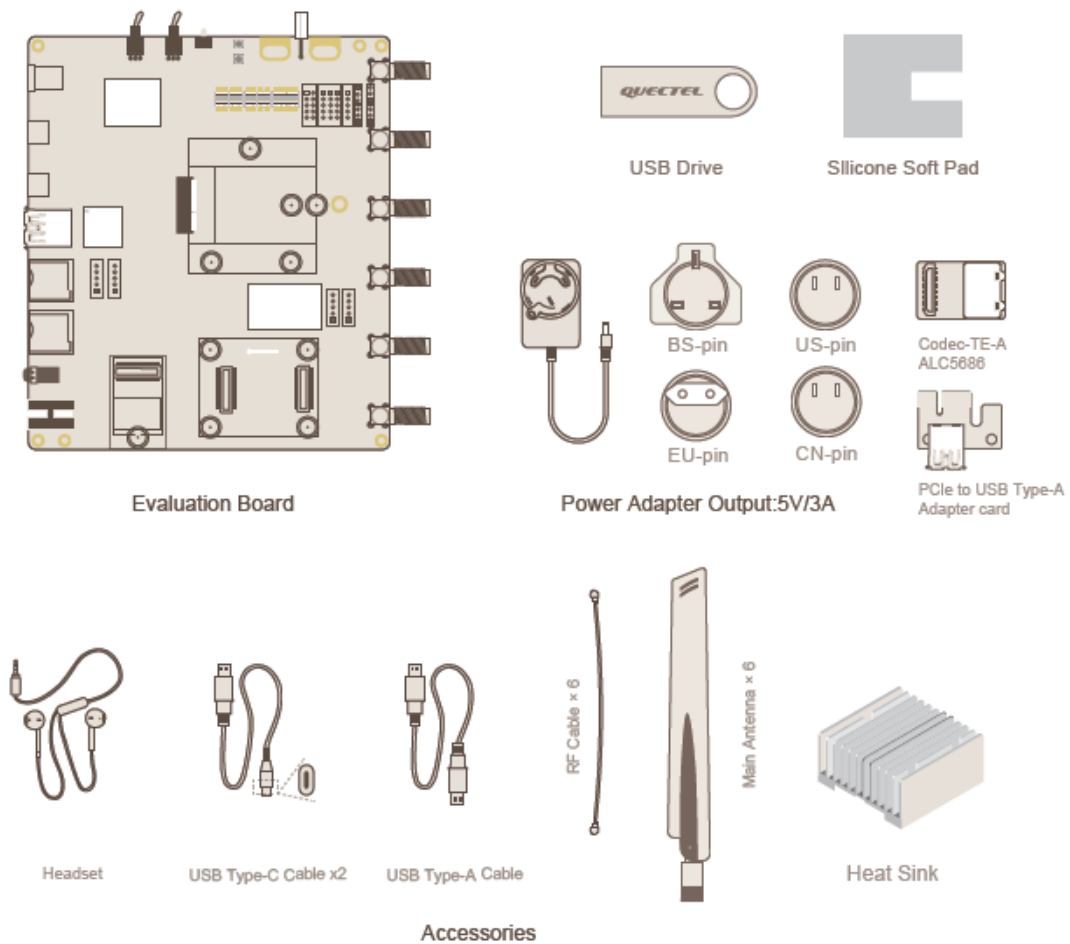
Figure 4: 5G-M2 EVB Kit

Table 3: Kit List

Item	Description	Quantity (pcs)
Power adapter	AC-DC power adapter (5 V/ 3 A) with BS/US/EU/CN pins	1
Cables	USB Type-A cable	1
	USB Type-C cables	2
	Sub-6 GHz RF cables	6
Antennas	Sub-6 GHz antennas	6
USB Drive	8 GB USB flash disk	1
Headset	3.5 mm earphone	1
ALC5686 TE-A	Codec module	1
PCIe to USB Type-A Adapter card	PCIe riser card 1x to USB 3.0	1
Silicone Soft Pad	Thermal conductive pad	1
Heatsink	60 mm × 60 mm black anodized heatsink	1
Instruction sheet	A sheet of paper giving instructions for EVB connection, details of EVB accessories, etc.	1
Others	Screws and copper cylinder for EVB assembling	4 pairs
	Screws for module and heatsink assembling	8

4 Interface Application

This chapter describes the following hardware interfaces of 5G-M2 EVB:

- Power supply
- M.2 interface
- USB interface
- USB-to-UART interface
- PCIe interfaces
- Audio interfaces
- (U)SIM card interfaces
- Status indicators
- Antenna interfaces
- Switches and button
- Test points

4.1. Power Supply

The EVB can be powered by an external power adapter through the 5 V power jack (J0202), or USB Type-C connectors (J0601 and J0901) on the EVB. The external power supply interfaces are used to apply voltage to the module directly. See the following table and figures for description of power supply and the simplified power supply block diagram of the EVB.

Table 4: Description of Power Supply

RefDes.	Description
J0202	Power jack on the EVB
J0601	USB Type-C connector
J0901	USB Type-C connector
J0105	External power connector
H0101/H0102	Current test hole/GND
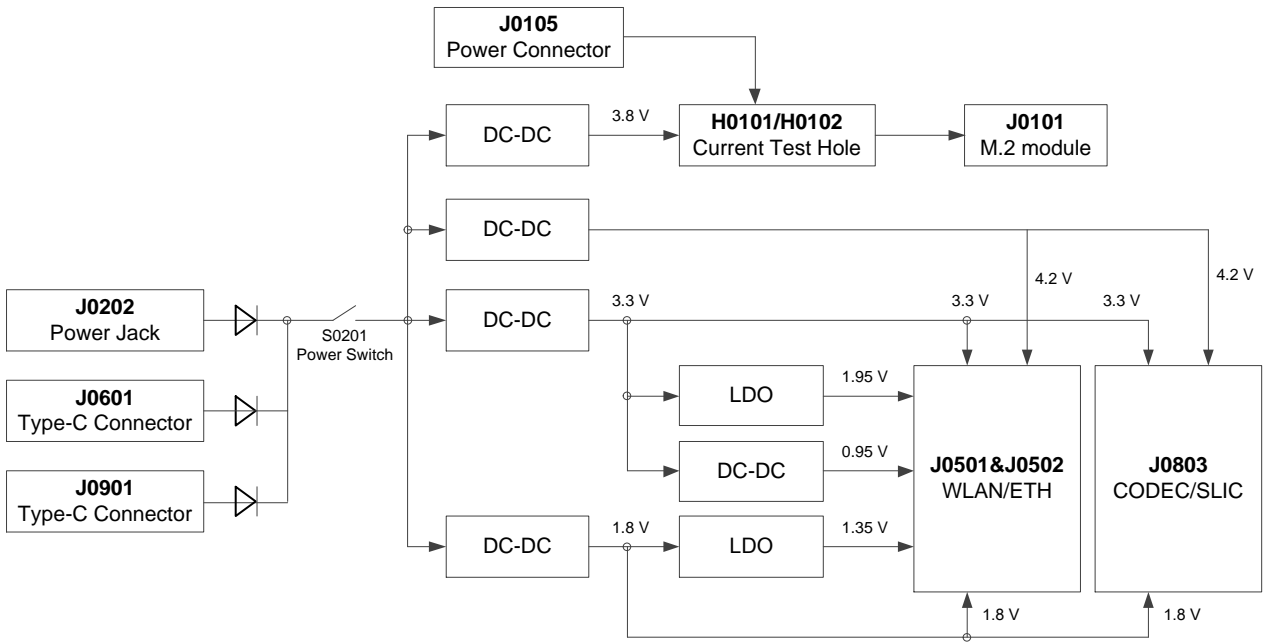
Figure 5: Block Diagram of EVB Power Supply
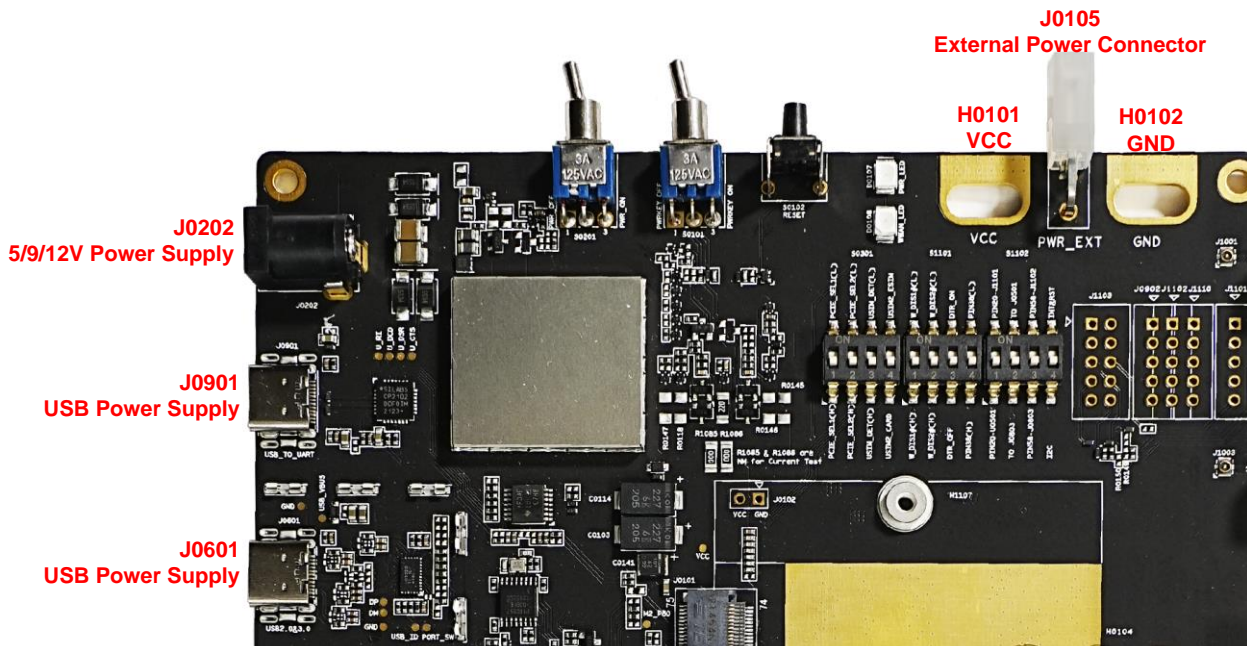
Figure 6: EVB Power Supply Interfaces

If the power jack is used for power supply, the power plug design of the adapter is shown as below.
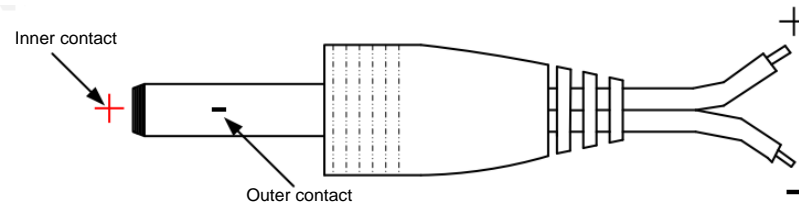
Figure 7: Power Plug Design

4.2. M.2 Interface

The M.2 interface is designed to accommodate the applicable modules. This interface is used to test functionalities of the module or to develop applications based on the module.

Table 5: Description of M.2 Interface

RefDes.	Description
J0101	M.2 connector for the module

The following figure shows the connection between the module and the EVB.
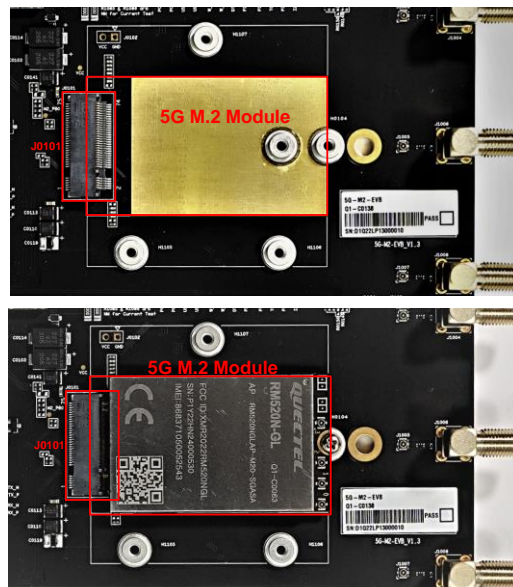
Figure 8: Connection Between Module and EVB

4.3. USB Interface

The EVB provides a USB 3.1/2.0 Type-C interface for the connection with a host and supports SuperSpeed (5 Gbps), high-speed (480 Mbps) and full-speed (12 Mbps), as shown in *Figure 9*. This USB interface can be used for AT command communication, data transmission, GNSS NMEA sentences output, software debugging and firmware upgrade. Also, it can be used as power supply interface for the EVB.

Table 6: Description of USB Interface

RefDes.	Description
J0601	USB Type-C connector
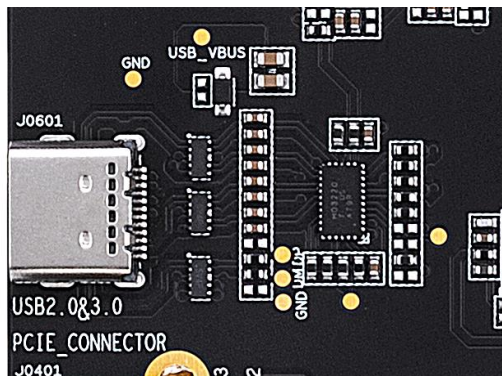
Figure 9: USB Type-C Connector
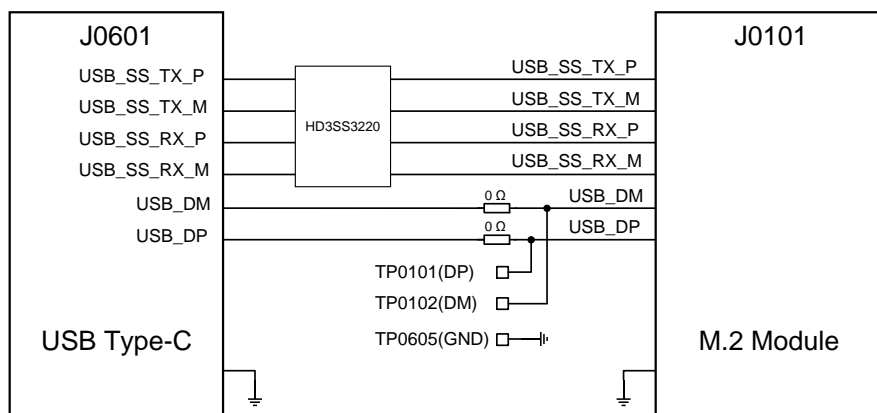
Figure 10: Connection Between the Module and the USB Type-C Interface

4.4. USB-to-UART Interface

The EVB provides a USB-to-UART interface. This interface is used for Linux console and converting log UART signal to USB 2.0 signal for debugging.

Table 7: Description of USB-to-UART Interface

RefDes.	Description
J0901	Used to convert debug UART to USB 2.0 signal
J0902.2	Used to connect the module's DBG_TXD and DBG_RXD to the EVB
J0902.3	

Before using the USB-to-UART interface, DBG_RXD and DBG_TXD of the module should be connected to the corresponding positions of J0902.2 (RXD_1V8) and J0902.3 (TXD_1V8) on the EVB respectively.

An example of the connection with RM500Q-GL module is shown as below. Test points might be different among applicable modules, please contact Quectel Technical Support if debug UART is needed.
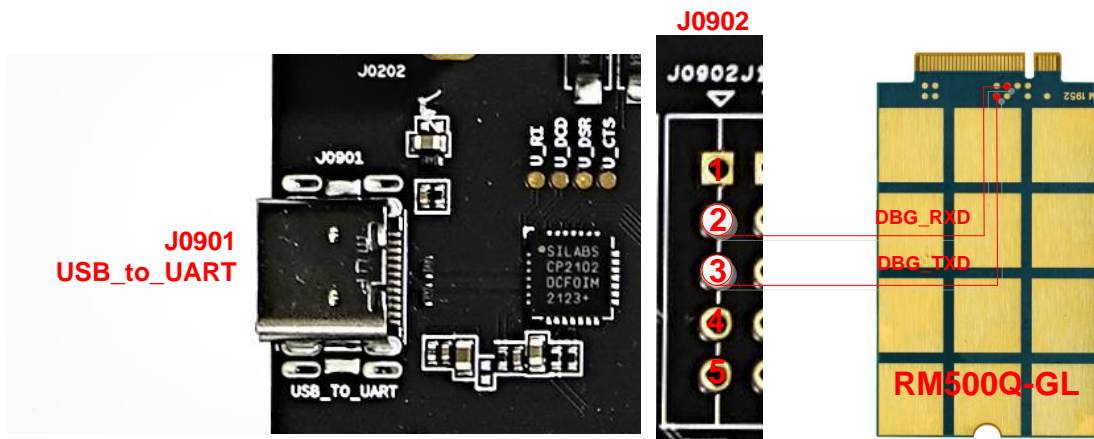
Figure 11: USB-to-UART Interface and Connection With Module

4.5. PCIe Interfaces

The EVB provides two PCIe interfaces to connect with PC or WLAN/Ethernet module.

Table 8: Description of PCIe Interfaces

RefDes.	Description
J0401	USB Type-A connector
J0501, J0502	BTB connectors

The PCIe connection is controlled by the first switch (S0301.1) and the second switch (S0301.2), both of which are set to **High-level** side (OFF) by default. Please refer to the following table and diagram.

Table 9: PCIe Connection Truth Table

PCIE_SEL1	PCIE_SEL2	Function
0 Low	1 High	Module: 100 MHz External PCIe Reference Clock
1 High	0 Low	Module: Type-A Receptacle & PC
1 High	1 High	Module: WLAN/Ethernet Module

- If S0301.1 (PCIE_SEL1) signal and S0301.2 (PCIE_SEL2) signal are set to **High-level** and **Low-level** side respectively, the PCIe interface of the M.2 module will be connected to Type-A interface (J0401) for communication with a PC.
- If S0301.1 (PCIE_SEL1) signal and S0301.2 (PCIE_SEL2) signal are all set to **High-level** side, the PCIe interface of the M.2 module will be connected to module via BTB connectors (J0501/J0502).
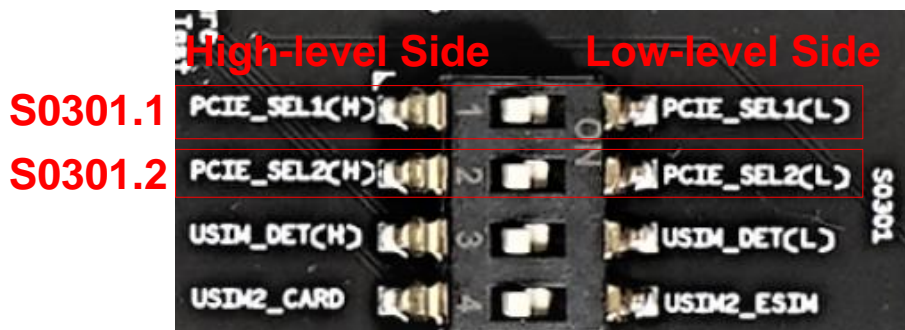
Figure 12: PCIe Selection Switch
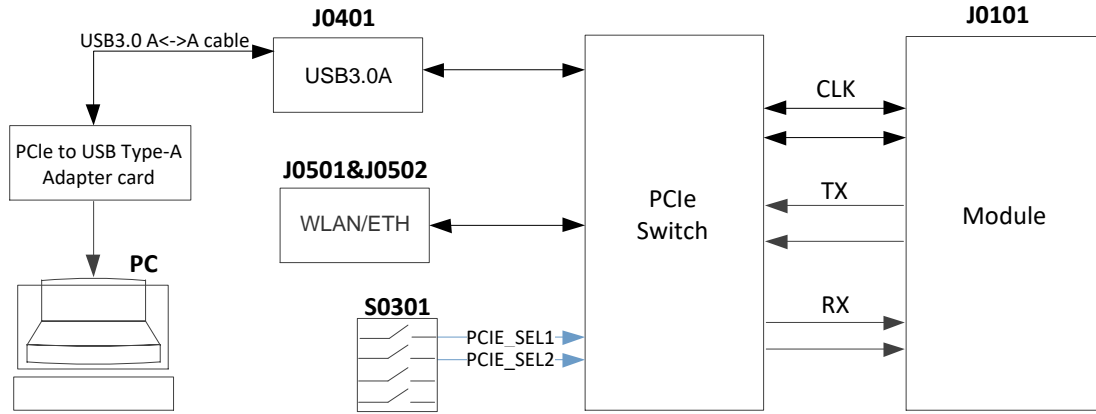
Figure 13: PCIe Interface Block Diagram

For the connection and function verification steps for Ethernet, see *Chapter 5.4*.

The EVB supports WLAN. PCIE_TX, PCIE_RX and other corresponding signal lines are connected from Wi-Fi module to M.2 module through two BTB connectors J0501 and J0502. The TE-A is not provided in the 5G-M2 EVB kit. Please contact Quectel Technical Support for more information regarding WLAN application if needed.

4.6. Audio Interfaces

The EVB provides one digital audio codec board interface and two analog audio interfaces.

Table 10: Description of Audio Interface

RefDes.	Description
J0801	Audio jack for earphone
J0802	Designed for headset
J0803	Codec board TE-A connector
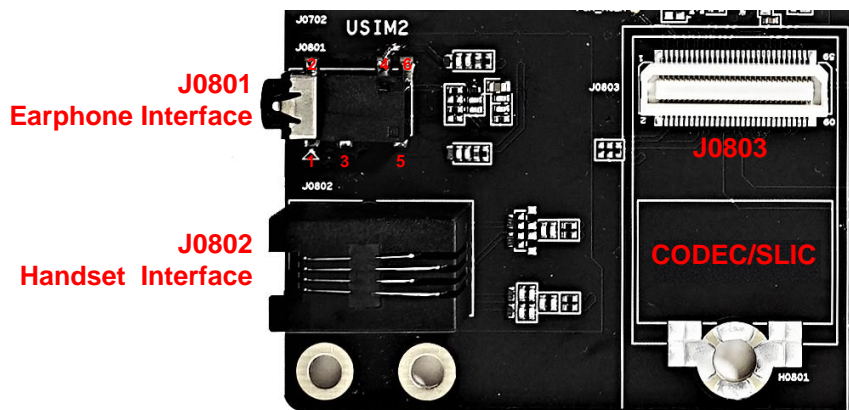
Figure 14: Audio Interfaces of the EVB

4.6.1. Digital Audio Codec Board Interface

The EVB supports external digital audio codec ALC5686 or SLIC LE9643. The codec or SLIC is
assembled on an independent TE-A which can be connected to the EVB by the BTB connector (J0803).
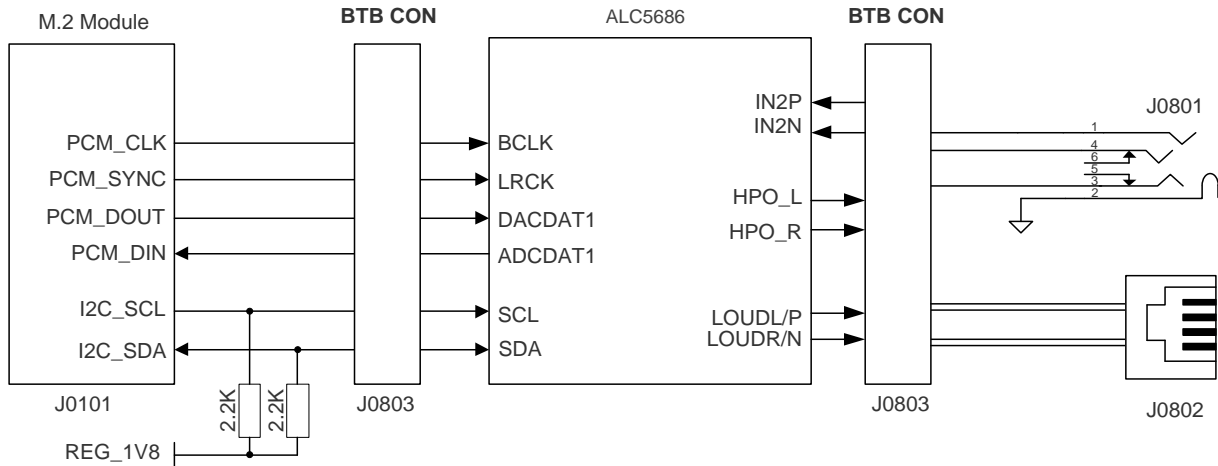
Figure 15: Connection Between Codec TE-A and Module
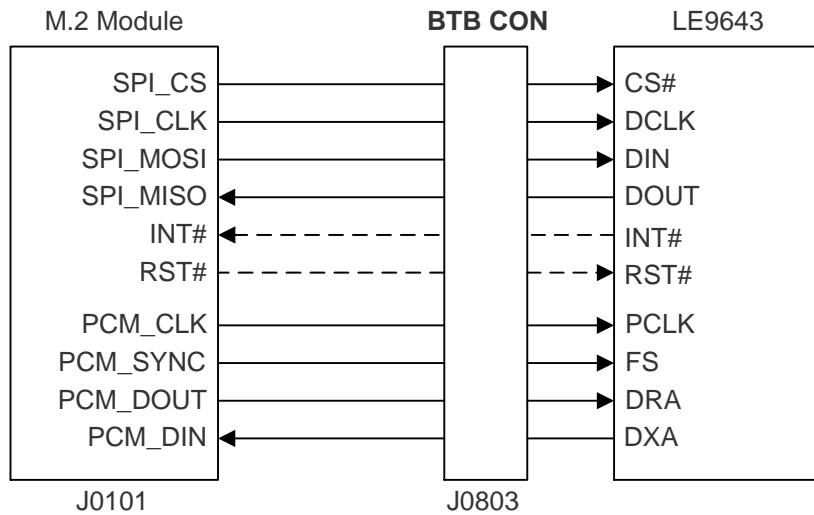
Figure 16: Connection Between SLIC TE-A and Module

4.6.2. Analog Audio Interfaces

4.6.2.1. Earphone Interface

The audio interface J0801 is designed for earphones. A schematic of the interface is shown by the following figure.
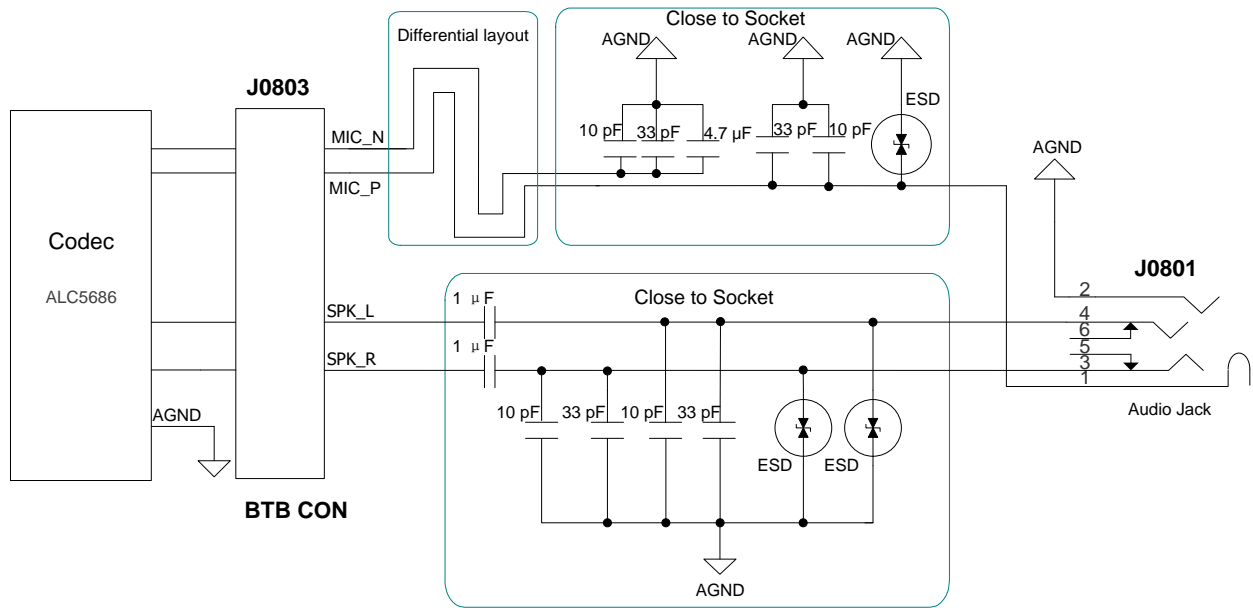
Figure 17: Schematic of Earphone Interface

The table below illustrates the pin assignment and definition of the earphone connector.

Table 11: Pin Definition of Earphone Interface

Pin No.	Pin Name	Description
1	MIC	Microphone analog input
2	AGND	Analog ground
3	SPK_R	Right channel of stereo audio output
4	SPK_L	Left channel of stereo audio output
5, 6	NC	Not connected

The following figure shows a reference design for the audio plug which matches the earphone connector on the EVB.
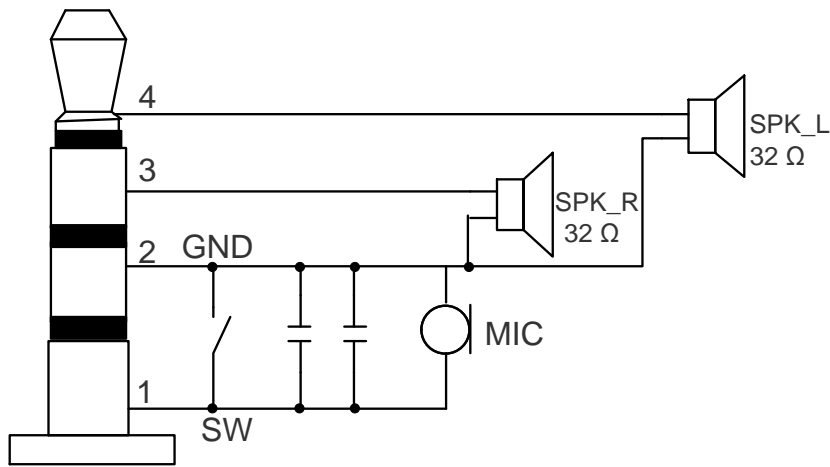
Figure 18: Reference Design for the Audio Plug

4.6.2.2. Handset Interface

The audio interface J0802 is designed for handsets. A schematic of the interface is shown below.
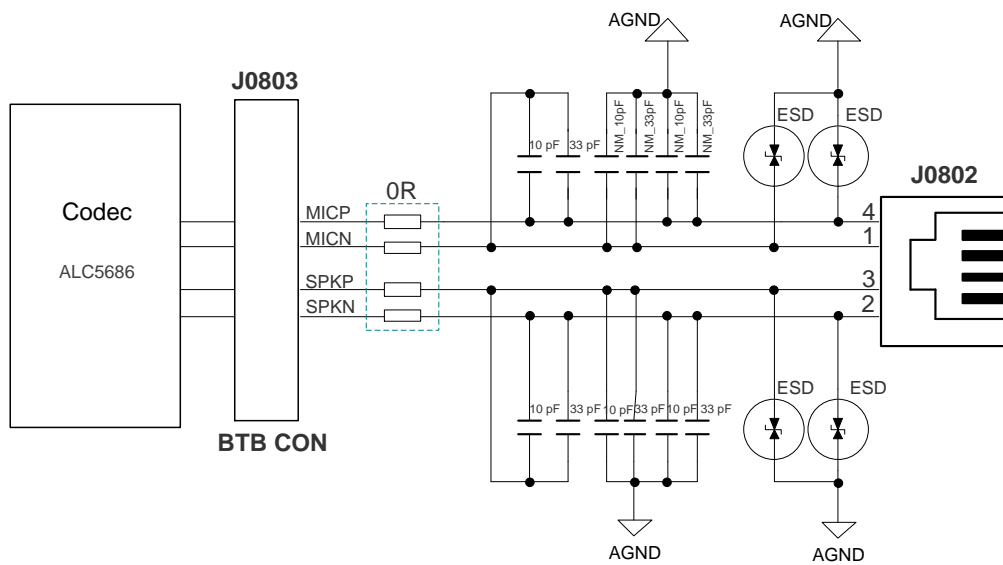
Figure 19: Schematic of Handset Interface

4.7. (U)SIM Card Interfaces

The EVB has two 6-pin push-push type (U)SIM card interfaces which support 1.8/3.0 V (U)SIM card.

Table 12: Description of (U)SIM Card Interfaces

RefDes.	Description
J0701	(U)SIM1 card connector
J0702	(U)SIM2 card connector

The following figures show a simplified schematic.
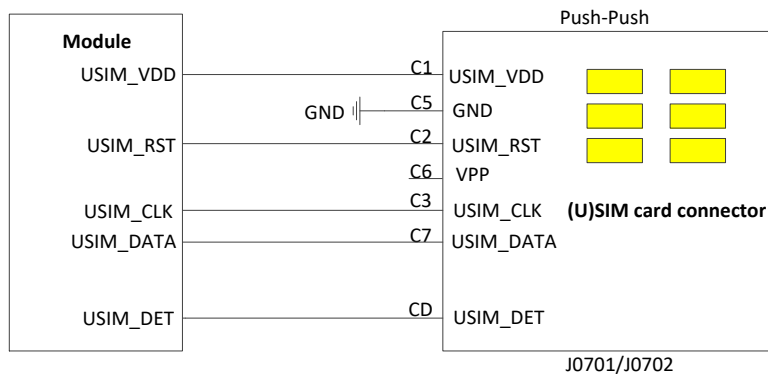
Figure 20: Simplified Connector Schematic for (U)SIM Card Connectors

The figure and table below illustrate the pin assignment and definition.
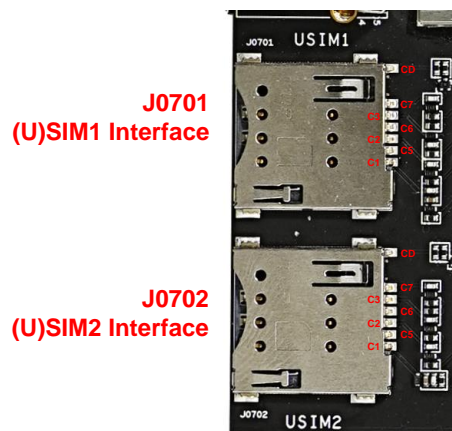
Figure 21: Pin Assignments of (U)SIM Interfaces

Table 13: Pin Definition of J0701/J0702

Pin No.	Pin Name	I/O	Description
C1	USIM_VDD	PO	(U)SIM card power supply
C2	USIM_RST	DO	(U)SIM card reset
C3	USIM_CLK	DO	(U)SIM card clock
C5	GND	-	Ground
C6	VPP	-	NC
C7	USIM_DATA	DIO	(U)SIM card data
CD	USIM_DET	DI	(U)SIM card hot-plug detect

4.8. Status Indicators

There are two status indication LEDs on the EVB. The description of these two indicators are shown below.

Table 14: Description of Status Indication LEDs

RefDes.	Description
D0107	Power up/down status indicator (PWR_LED) for the module ● Light on: the module is powered up ● Light off: the module is powered down
D0108	RF status indicator (WWAN_LED) for the module ● Light on: RF function is enabled ● Light off: RF function is disabled

4.9. Antenna Interfaces

The six antennas provided in the EVB kit are exactly the same. They support 600–6000 MHz and can be randomly connected to the six antenna connectors (ANT0–ANT5) on the EVB.

Table 15: Description of Antenna Interfaces

RefDes.	Description
J1002	
J1004	
J1006	Antenna connectors
J1008	
J1010	
J1012	

The following figure shows the position of these antenna interfaces.
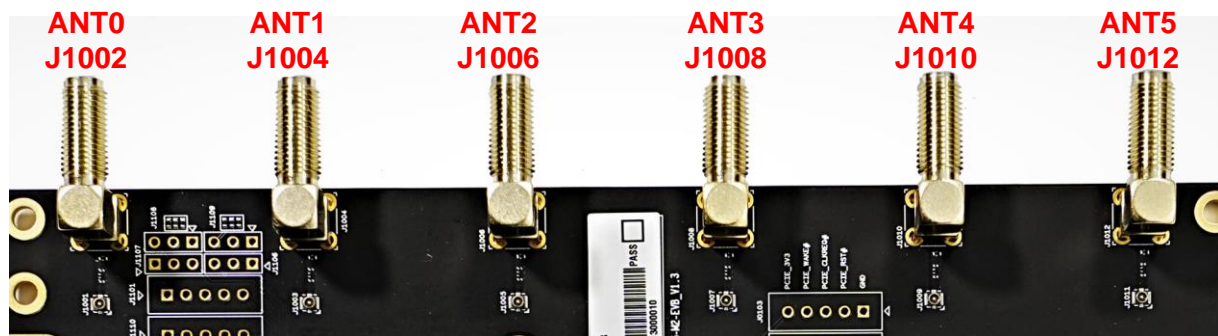
Figure 22: Antenna Interfaces

4.10. Switches and Button

The EVB includes five switches and one button, as shown in the following table and figures:
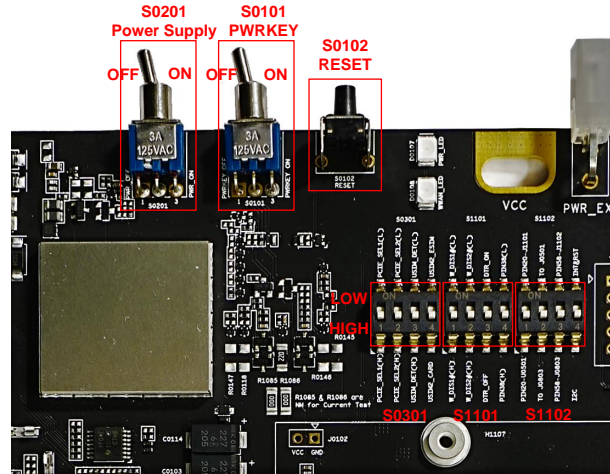
Figure 23: Switches and Button

Table 16: Description of Switches and Button

RefDes		Function Description
S0201		Used to power up/down the EVB and module
S0101		Used to turn on/off the module
S0102		● Reset button (push button) ● Used to reset the module
S0301	S0301.1	PCIE_SEL1
	S0301.2	PCIE_SEL2
	S0301.3	The hot-plug detection of USIM1 and USIM2 ● Low: the USIM1_DET and USIM2_DET signals are low when the card is inserted ● High: the USIM1_DET and USIM2_DET signals are high when the card is inserted
	S0301.4	(U)SIM2 and eSIM selection ● Low: (U)SIM2 is connected to the onboard eSIM (eSIM is not mounted by default) ● High: (U)SIM2 is connected to the (U)SIM2 card slot

S1101	S1101.1	Used to turn on/off airplane mode ● Low (FLIGHT_MD): turn on airplane mode ● High (NORMAL_MD): turn off airplane mode
	S1101.2	Used to enable/disable GNSS function ● Low (GNSS_OFF): disable GNSS function ● High (GNSS_ON): enable GNSS function
	S1101.3	● Low: connect DBG_UART_DTR signal to an internal load switch, and the module can be turned on/off via DTR signal (Low/High) ● High: DBG_UART_DTR signal is not connected, and the module cannot be turned on/off via DTR signal (Low/High)
	S1101.4	Connected to pin 38 of the module via a resistor. The resistor is not mounted by default. ● Low: connect to GND ● High: not connected
S1102	S1102.1	Pins[1] 20, 22, 24 and 28 of the module selections ● Low: switch to J1101 ● High: switch to PCIe LAN2 (FG50V)
	S1102.2	PCM/I2S selection ● Low: the PCM/I2S signal of the module is connected to WLAN/ETH ● High: the PCM/I2S signal of the module is connected to Codec
	S1102.3	Pins 58, 59, 61 and 63 of the module selections ● Low: switch to J1102 ● High: switch to Codec I2C
	S1102.4	Pin 38 and 68 of the module selections ● Low: switch to BT PCM ● High: switch to Codec/SLIC PCM

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[1] Pin definitions might be different among applicable modules, please contact Quectel Technical Support in case of different pin definition.

4.11. Test Points

The EVB provides a series of test points, helping to obtain the corresponding waveform of specific signals, as shown by the following figure and table.
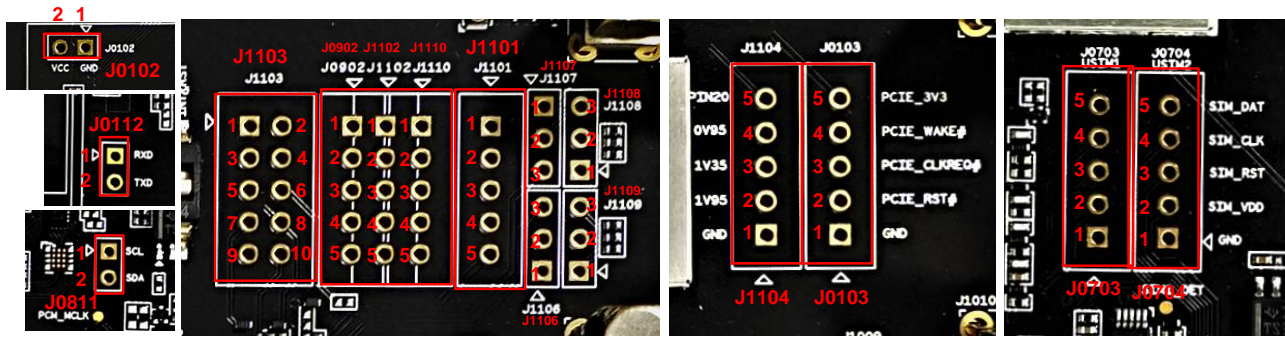
Figure 24: Test Points

Table 17: Pin Definition of Test Points

J0102			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	VCC	2, 4, 70, 72, 74	Power supply for the module
J0103			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	PERST#	50	PCIe reset, active low
3	CLKREQ#	52	PCIe clock request, active low
4	PEWAKE#	54	PCIe wake up, active low
5	PCIE_3V3	NA	Connected to Type-A receptacle (J0401)
J0112			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**

| 1 | COEX_RXD | 62 | 5G/LTE & WLAN coexistence receive (1.8 V) |
| 2 | COEX_TXD | 64 | 5G/LTE & WLAN coexistence transmit (1.8 V) |

J0811

Pin No.	Pin Name	Module Pin No.	Description
1	INT/SCL	38	Connected to Pin 38 of the module
2	RST/SDA	68	Connected to Pin 68 of the module

J0703

Pin No.	Pin Name	Module Pin No.	Description
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	USIM1_VDD	36	(U)SIM1 card power supply
3	USIM1_RST	30	(U)SIM1 card reset
4	USIM1_CLK	32	(U)SIM1 card clock
5	USIM1_DATA	34	(U)SIM1 card data

J0704

Pin No.	Pin Name	Module Pin No.	Description
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	USIM2_VDD	48	(U)SIM2 card power supply
3	USIM2_RST	46	(U)SIM2 card reset
4	USIM2_CLK	44	(U)SIM2 card clock
5	USIM2_DATA	42	(U)SIM2 card data

J0902

Pin No.	Pin Name	Module Pin No.	Description
1	GND	NA	Ground
2	DBG_UART_RX	NA	DEBUG_UART_RXD_1V8
3	DBG_UART_TX	NA	DEBUG_UART_TXD_1V8
4	DBG_UART_DTR	NA	DEBUG_UART_DTR_1V8

| 5 | DBG_UART_RTS | NA | DEBUG_UART_RTS_1V8 |

J1101			35 / 48
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	GND	NA	Ground
2	PWR_5V0	NA	5 V power supply
3	PWR_3V8	NA	3.8 V power output of DC-DC
4	PWR_3V3	NA	3.3 V power output of DC-DC
5	PWR_1V8	NA	1.8 V power output of DC-DC

J1103			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	RFFE_VIO_1V8	65	Connected to Pin 56 of the module
3	RTS_RST	NA	Reset the module, active high
4	FULL_CARD_POWER_OFF#	6	Turn on/off the module
5	RESET#	67	Reset the module, active low
6	GPS_PPS	56	Connected to Pin 56 of the module
7	DPR	25	Dynamic power reduction signal
8	W_DISABLE2#	26	GNSS disable control, active low
9	WOWWAN#	23	Wake up the host, active low
10	W_DISABLE1#	8	Airplane mode control, active low

J1104			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	GND	NA	Ground
2	PWR_1V95	NA	1.95 V power output of LDO
3	PWR_1V35	NA	1.35 V power output of LDO
4	PWR_0V95	NA	0.95 V power output of DC-DC

| 5 | M2_PIN20 | 20 | Connected to the module pin 20 |

J1102

Pin No.	Pin Name	Module Pin No.	Description
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	DBG_UART0_RX	63 / NA	Connected to pin 63 of the module as Debug UART RXD if S1102.3 is closed, otherwise not connected
3	DBG_UART0_TX	61 / NA	Connected to pin 61 of the module as Debug UART TXD if S1102.3 is closed, otherwise not connected
4	DBG_UART0_RTS	59 / NA	Connected to pin 59 of the module as Debug UART RTS if S1102.3 is closed, otherwise not connected
5	DBG_UART0_CTS	58 / NA	Connected to pin 58 of the module as Debug UART CTS if S1102.3 is closed, otherwise not connected

J1106

Pin No.	Pin Name	Module Pin No.	Description
1	GND	NA	Ground
2	NC	NA	Not connected
3	USB_BOOT	NA	Pulled up to 1.8 V with a 10 KΩ resistor Connected to USB_BOOT pin of the module before turning on, and it forces the module into emergency download mode

J1107

Pin No.	Pin Name	Module Pin No.	Description
1	PWR_UP_3V3	NA	3.3 V power output of DC-DC
2	PWR_UP	NA	Internally connected to pins 1, 2 and 3 of J1108 with a 1 kΩ, a 10 kΩ and a 100 kΩ resistors respectively
3	PWR_UP_1V8	NA	1.8 V power supply

J1108

Pin No.	Pin Name	Module Pin No.	Description

| 1	PU_1K	NA	Pulled up to J1107.2 with a 1 kΩ resistor
2	PU_10K	NA	Pulled up to J1107.2 with a 10 kΩ resistor
3	PU_100K	NA	Pulled up to J1107.2 with a 100 kΩ resistor
J1109			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	PD_1K	NA	Pulled down to ground with a 1 kΩ resistor
2	PD_10K	NA	Pulled down to ground with a 10 kΩ resistor
3	PD_100K	NA	Pulled down to ground with a 100 kΩ resistor
J1110			
Pin No.	**Pin Name**	**Module Pin No.**	**Description**
1	GND	3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 79	Ground
2	DBG_UART4_RX	22 / NA	Connected to pin 22 of the module as Debug UART4 RXD if S1102.1 is closed, otherwise not connected
3	DBG_UART4_TX	28 / NA	Connected to pin 28 of the module as Debug UART TXD if S1102.1 is closed, otherwise not connected
4	WLAN_EN	20 / NA	Connected to pin 20 of the module as WLAN enable signal if S1102.1 is closed, otherwise not connected
5	HOST_WAKEUP_BT	24 / NA	Connected to pin 24 of the module as host wakeup Bluetooth signal if S1102.1 is closed, otherwise not connected

NOTE

The descriptions of test points above are for reference only. The signals of the test points depend on the actual modules you used. For more details, see hardware design of applicable modules or contact Quectel Technical Support if needed.

5 Operation Procedures

This chapter introduces how to use the 5G-M2 EVB for the testing and evaluation of the applicable modules.

5.1. Turn On the Module

1. Run the USB flash disk on the PC to install the corresponding USB driver. For details about the USB driver installation, see *document [2]*.
2. Insert the applicable M.2 module to the EVB M.2 connector (J0101), and then fix it with screws.
3. Connect the power jack (J0202) to a power supply through a 5 V/ 3 A power adapter.
4. Connect the USB Type-C receptacle (J0601) to a PC via the USB 3.0 Type-C cable.
5. Switch the power switch (S0201) to the **PWR_ON** side, then PWR_LED (D0107) will light up, indicating that the EVB powers up. In such case, switch PWRKEY (S0101) to the **ON** side, then the module will turn on, and WWAN_LED (D0108) will light on when the RF function is enabled.
6. The corresponding USB device will be found in Device Manager of the PC after the module starts up completely, as shown by the following figure.
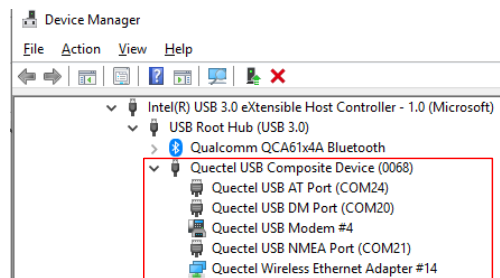
Figure 25: USB Device Exhibited in Device Manager

NOTE

1. If the PWRKEY has been switched to "**PWR_ON**" side before the power supply is connected, the module and the EVB will turn on automatically when the power adapter is connected.
2. The turn-on should be performed only after the EVB assembling is completed to avoid any possible damage.

5.2. Turn Off the Module

There are two methods to turn off the module.

- Turn off the module with **AT+QPOWD**. This is the best and the safest method. The module will log off from the network and save data before shutdown. When turning off the module with AT command, please keep PWRKEY at a high level after the execution of the turn-off command, otherwise, the module will be turned on again after successful turn-off.
- Turn off the module by switching S0201 to **PWR_OFF** side.

5.3. Communication via USB

1. Turn on the module according to the procedure in *Chapter 5.1*.
2. Install and then open the communication tool QCOM provided by Quectel.
3. Select "**COM Port**" (the port number of USB AT Port, e.g., "COM24" in *Figure 26*) and "**Baudrate**" (e.g. 115200 bps), and then click "**Open Port**". For more details about the usage of QCOM, see *document [3]*.
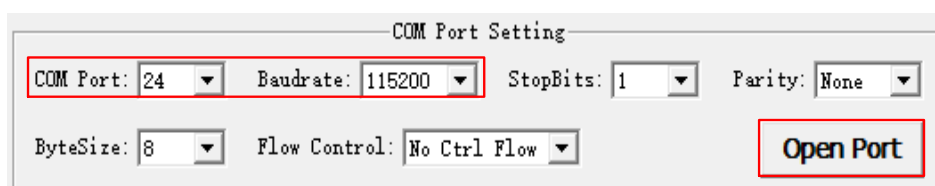
Figure 26: COM Port and Baudrate Configurations

4. After the port opens successfully, the communication with the module via USB is established. The module would response when sending AT commands by QCOM, as the following example. For detailed AT commands, see *document [4]*.
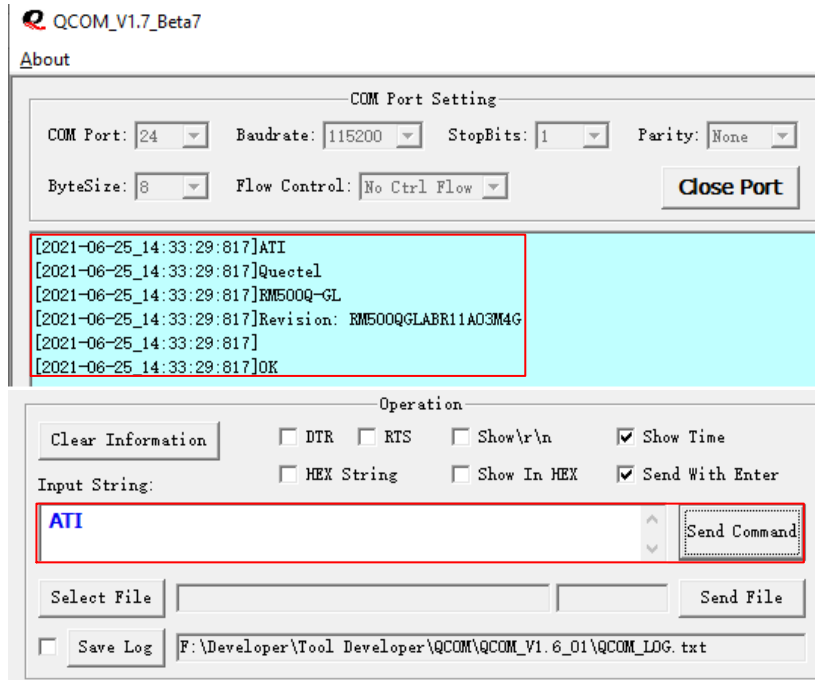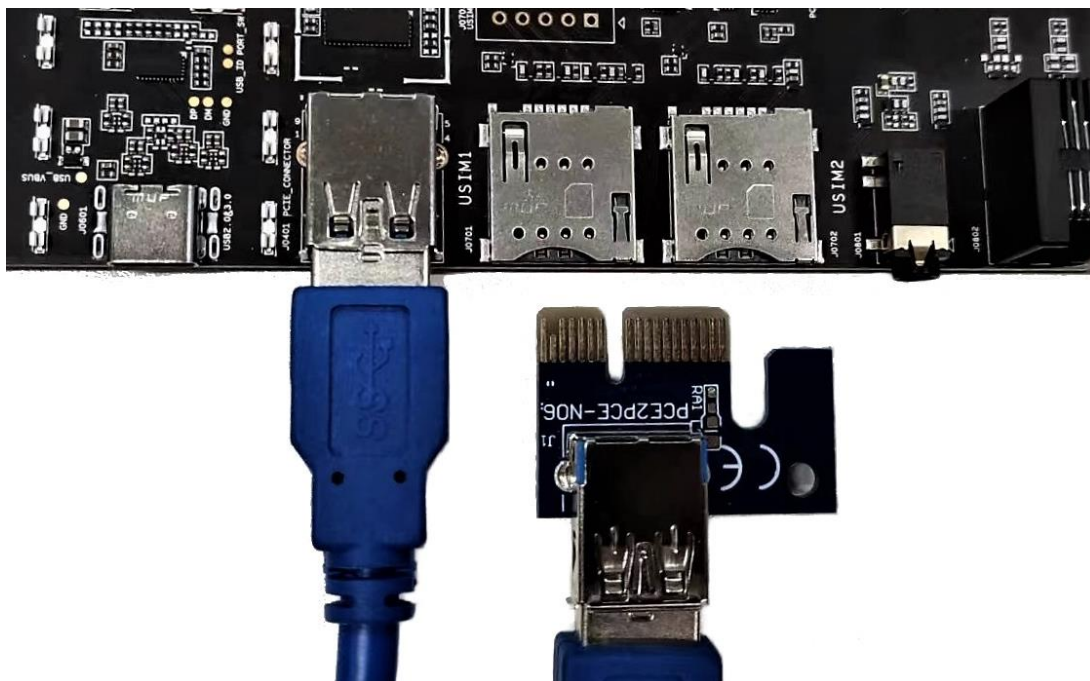
Figure 27: Example of AT Command

5.4. Communication via PCIe Interface
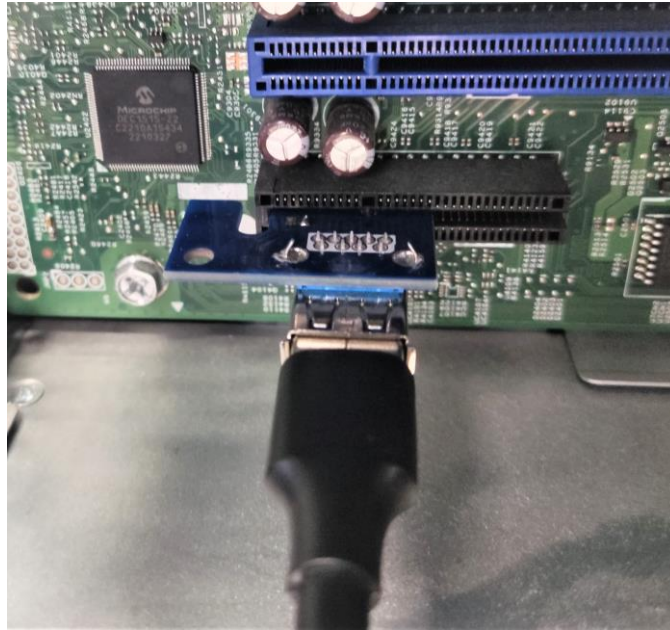
5.4.1. Connection Between Module and PC

1. Set S0301.2 (PCIE_SEL2) to **Low-level** side.
2. Insert an applicable module (e.g., RM500Q-GL) into the M.2 connector (J0101).
3. Connect the AC-DC power adapter (5 V/3 A) between an AC power source and the power jack (J0202).
4. Connect the EVB to a mini PCIe riser card via Type-A connector J0401 with a Type-A to Type-A cable.

The cable in the figure below is for reference only. Cable in the kit is subject to the actual supply.

Figure 28: Connection Between Type-A Interface and PCIe-to-USB Type-A Adapter Card

5. Insert the adapter to PCIe card slot of the desktop computer as the figure below.

Figure 29: EVB and Desktop Computer Connection via PCIe Interface

6. Turn on the module and turn on PC simultaneously.
7. The corresponding ports and PCIe device will be found in Device Manager of the PC after the module starts up completely, as shown by the following figure.
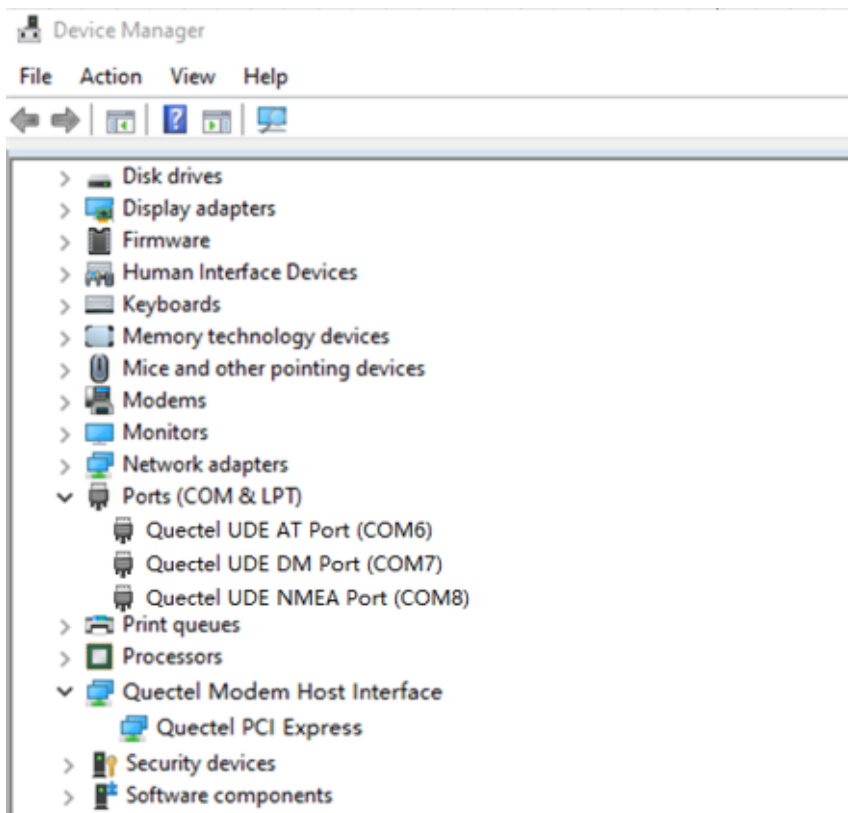
Figure 30: PCI Express and Ports Exhibited in Device Manager

5.4.2. Connection Between Module and Ethernet

1. Set S0301.1 (PCIE_SEL1) and S0301.2 (PCIE_SEL2) to **High-Level** side.
2. Insert an applicable module (e.g., RM500Q-GL), which should be configured by AT Commands [2], into the M.2 connector (J0101), and assemble the four antennas.
3. Insert the RTL8111H TE-A into the BTB connector (J0501, J0502).
4. Connect the EVB and PC with an Ethernet cable.
5. Connect the AC-DC power adapter (5 V/ 3 A) between an AC power source and the power jack (J0202).
6. Switch S0201 to **PWR_ON** side and S0101 to **PWRKEY_ON** side to power up the whole EVB and turn on the module
7. Wait until the green LED on RTL8111H TE-A blinks, which shows that the Ethernet PHY works normally.

NOTE

The Ethernet TE-A is not provided in the 5G-M2 EVB kit. Please contact Quectel Technical Support if needed.

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[2] The following AT commands are used to set the module into WLAN/Ethernet function mode:
- **AT+QCFG="data_interface",1,0**: switch the module to PCIe interface.
- **AT+QCFG="pcie/mode",1**: set the module to PCIe RC mode.
- **AT+QETH="eth_driver","R8168",1**: load the driver for RTL8111H TE-A.
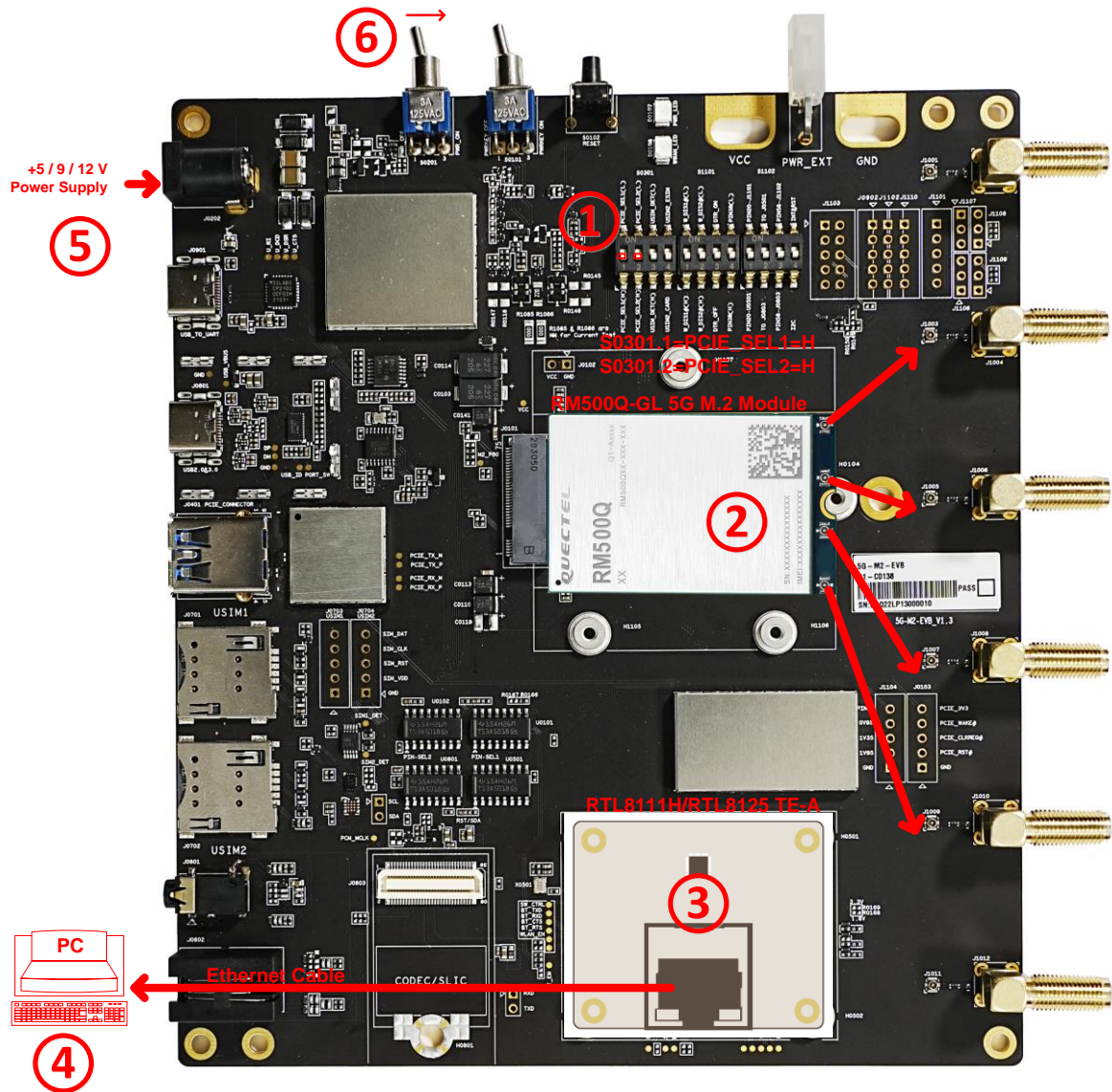- **AT+QETH="eth_at","enable"**: enable the driver.

Figure 31: Connection Between EVB and PC via Ethernet

5.5. Firmware Upgrade

The firmware of the module is upgraded via a USB port by default, follow the procedures below to upgrade the firmware.

1. Turn on the module according to the procedures in *Chapter 5.1*.
2. Install and open the firmware upgrade tool QFlash provided by Quectel on the PC.
3. Click the "**COM Port**" dropdown list and select the port number corresponding to "Quectel USB DM port" in the Device Manager (e.g., "COM20" in *Figure 32*) and select "**Baudrate**", as illustrated by the following figure.
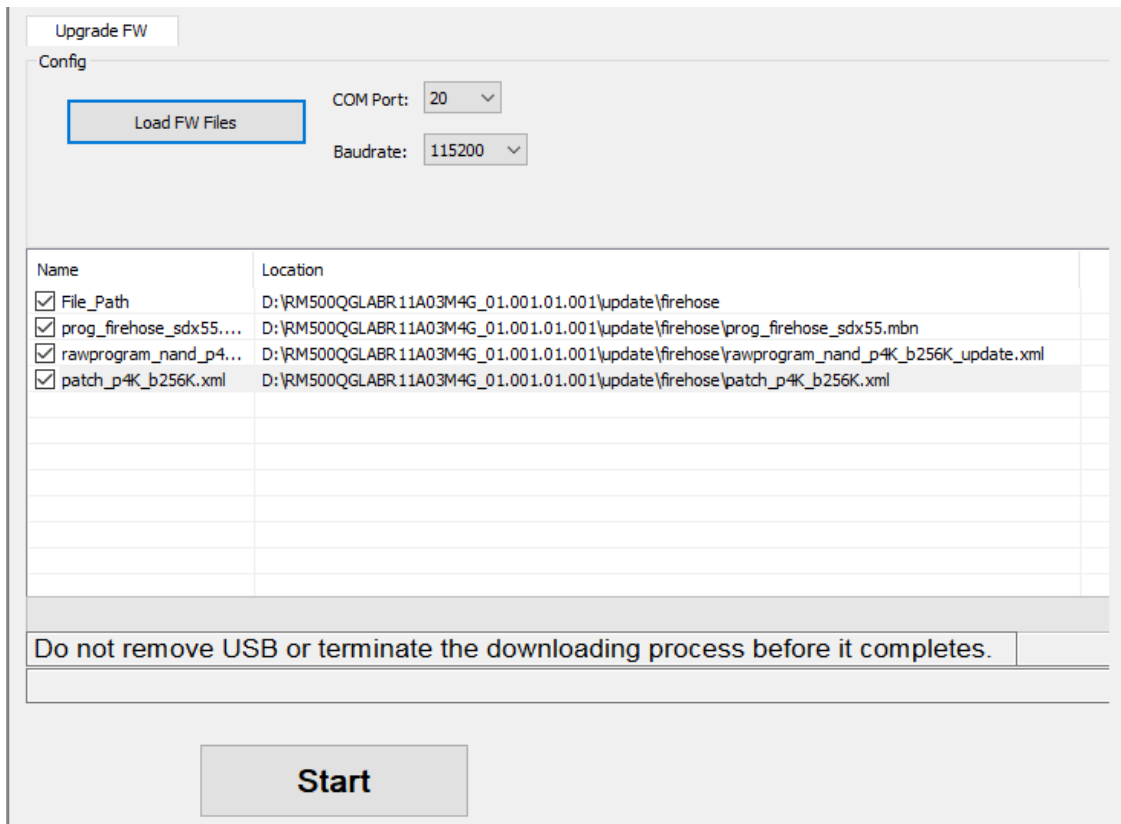
Figure 32: Firmware Upgrade Configurations

4. Click the "**Load FW Files**" button to select and load the firmware package.
5. Click the "**Start**" button to start the firmware upgrade.

For more details about QFlash usage and configuration, see *document [5]*.

5.6. Reset the Module

Reset is only used in case of emergency or abnormality. For example, the software fails to respond for more than 5 seconds due to some serious problems.

Long press the button S0102, and then release it to reset the module. Please note that this operation may disconnect the module from network and cause loss of information in the memory as the module will be initialized after the resetting.

5.7. Power Consumption Test

The EVB can also be used to test the power consumption of the module.
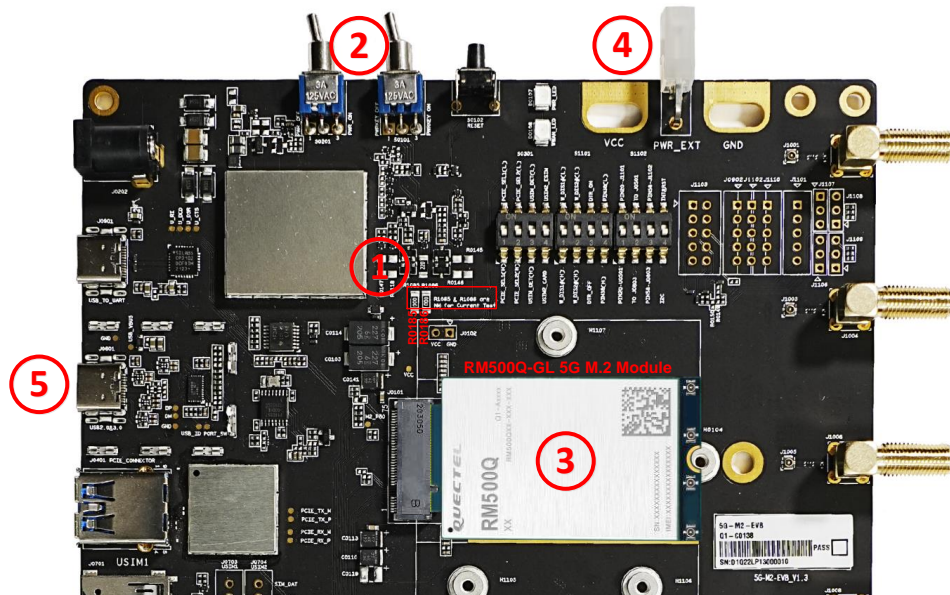
Figure 33: Modifications and Configurations for Power Consumption

1. Remove R0185 and R0186.
2. Set PWRKEY (S0101) to the **ON** side.
   Set the power switch (S0201) to the **PWR_ON** side to get the power consumption in sleep mode at USB 3.0, or set S0201 to **PWR_OFF** side to get the power consumption in sleep mode at USB 2.0.
3. Insert an applicable module (e.g., RM500Q-GL) into the M.2 connector (J0101).
4. Connect an external power supply to the oval vias marked as VCC and GND. Then turn on the external power supply, and the module would be powered independently.
5. Connect the USB Type-C interface (J0601) to the USB interface of PC.
6. Test the power consumption according to specific demand.

6 Appendix References

Table 18: Related Documents

Document Name
[1] Quectel_List_of_EVB_Applicable_Modules
[2] Quectel_LTE&5G_Windows_USB_Driver_Installation_Guide
[3] Quectel_QCOM_User_Guide
[4] Quectel_RG50xQ&RM5xxQ_Series_AT_Commands_Manual
[5] Quectel_QFlash_User_Guide

Table 19: Terms and Abbreviations

Abbreviation	Description
BTB	Board to Board
DI	Digital Input
DO	Digital Output
EVB	Evaluation Board
GNSS	Global Navigation Satellite System
I/O	Input/Output
LED	Light Emitting Diode
WLAN	Wireless Local Area Network
ETH	Ethernet
SLIC	Subscriber Line Interface Circuit

NC	Not Connected
PC	Personal Computer
PCB	Printed Circuit Board
PCIe	Peripheral Component Interconnect Express
PO	Power Output
RefDes	Reference Designator
RF	Radio Frequency
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
(U)SIM	(Universal) Subscriber Identity Module