

5G-M2 EVB

User Guide

5G Module Series

Version: 1.0

Date: 2021-11-18

Status: Released



At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

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

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

For technical support, or to report documentation errors, please visit:

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

Or email us at: support@quectel.com.

Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

Use and Disclosure Restrictions

License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

Third-Party Rights

This document may refer to hardware, software and/or documentation owned by one or more third parties ("third-party materials"). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel's or third-party's servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

Disclaimer

- a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
- b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
- c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
- d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

Copyright © Quectel Wireless Solutions Co., Ltd. 2021. All rights reserved.

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 the module. Manufacturers of the cellular 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 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 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.



Cellular 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 cellular 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 cellular 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 cellular 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

Contents

Safety Information.....	3
About the Document.....	4
Contents.....	5
Table Index.....	6
Figure Index.....	7
1 Introduction	8
1.1. Special Mark	8
2 General Overview.....	9
2.1. Key Features.....	9
2.2. Top View and Component Placement	10
2.3. EVB Kit Accessories	12
3 Interface Application	14
3.1. Power Supply (J0202/J0601).....	14
3.2. Switches, Button and Status Indicators	15
3.3. M.2 Interface (J0101).....	16
3.4. USB Type-C Interface (J0601)	17
3.5. USB-TO-UART Interface (J0901/J0902)	18
3.6. (U)SIM Interfaces (J0701/J0702).....	19
3.7. Audio Interfaces (J0801/J0802/J0803).....	20
3.7.1. Digital Audio Interface (J0803).....	20
3.7.2. Analog Audio Interfaces (J0801/J0802).....	21
3.7.2.1. Earphone Interface (J0801)	21
3.7.2.2. Handset Interface (J0802)	23
3.8. PCIe Interface to WLAN/Ethernet Module (J0501/J0502).....	23
3.9. Antenna Interfaces	25
3.10. Test Points	25
4 Operation Procedures	28
4.1. Turn On the Module	28
4.2. Communication via USB	29
4.3. Firmware Upgrade	30
4.4. Reset the Module	31
4.5. Turn Off the Module	31
4.6. Current Consumption Test.....	32
5 Appendix References	33

Table Index

Table 1: Special Mark.....	8
Table 2: Key Features of 5G-M2 EVB	9
Table 3: Interfaces and Components of the EVB	11
Table 4: Accessory List	12
Table 5: Description of Switches, Button and Status Indicators.....	16
Table 6: Pin Definition of J0701/J0702	19
Table 7: Pin Definition of Earphone Interface (J0801).....	22
Table 8: Description of Test Points	26
Table 9: Related Documents.....	33
Table 10: Terms and Abbreviations	33

Figure Index

Figure 1: Top View and Component Placement of the EVB.....	10
Figure 2: 5G-M2 EVB Kit Accessories.....	12
Figure 3: EVB Power Supply Block Diagram.....	14
Figure 4: EVB Power Supply Interfaces (J0202/J0601)	15
Figure 5: Switches, Button and Status Indicators	15
Figure 6: M.2 Connector of the EVB	17
Figure 7: USB Type-C Interface (J0601)	17
Figure 8: Block Diagram of Connections Between the Module and the USB Type-C Interface	18
Figure 9: USB-TO-UART Interface (J0901/J0902)	18
Figure 10: Pin Assignments of (U)SIM Interfaces (J0701/J0702)	19
Figure 11: Audio Interfaces of the EVB (J0801/J0802/J0803)	20
Figure 12: Block Diagram of the Connection Between the Codec TE-A and the Module.....	20
Figure 13: Block Diagram of the Connection Between the SLIC TE-A and the Module	21
Figure 14: Schematic of Earphone Interface (J0801).....	21
Figure 15: Reference Design for the Audio Plug	22
Figure 16: Schematic of Handset Interface (J0802)	23
Figure 17: PCIe Interface Block Diagram	23
Figure 18: Connections Between the EVB and a PC via Ethernet.....	24
Figure 19: Test Points of the EVB.....	25
Figure 20: USB Device Exhibited in Device Manager	28
Figure 21: COM Port and Baudrate Configurations.....	29
Figure 22: Example of an AT Command.....	29
Figure 23: Firmware Upgrade Configurations.....	30
Figure 24: Modifications and Configurations for Current Consumption	32

1 Introduction

This document describes how to use the 5G-M2 EVB, which is an assistant tool for engineers to develop and test Quectel's RM500Q series, RM502Q series, and RM505Q-AE modules.

1.1. 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 General Overview

Quectel provides the 5G-M2 EVB to engineers to develop applications, and test these basic functionalities of RM500Q series, RM502Q series, and RM505Q-AE modules.

2.1. Key Features

Table 2: Key Features of 5G-M2 EVB

Function	Description
Power Supply	Typical power supply: <ul style="list-style-type: none"> ● Power jack: 5 V / 3 A ● USB Type-C: 5 V
M.2 Interface	Standard PCI Express M.2 interface
(U)SIM	<ul style="list-style-type: none"> ● (U)SIM1 and (U)SIM2 interfaces ● (U)SIM card insertion detection ● Class B (3.0 V) and Class C (1.8 V)
USB	<ul style="list-style-type: none"> ● USB Type-C interface ● USB 2.0 & 3.0
USB-TO-UART	<ul style="list-style-type: none"> ● Converts debug UART to USB 2.0 signal (J0901) ● Connects the module's DBG_TXD and DBG_RXD to the EVB (J0902)
WLAN/Ethernet	Supports AF50T WLAN or RTL8111H/RTL8125 Ethernet
Audio	<ul style="list-style-type: none"> ● Supports ALC5686 codec board or LE9643 SLIC board ● Earphone: <ul style="list-style-type: none"> - 3.5 mm earphone interface - Used to test the analog audio function of codec modules ● Handset: <ul style="list-style-type: none"> - RJ11-4P handset interface - Used to test the analog audio function of SLIC module
Physical Characteristics	Size: 146 mm × 168 mm
Antenna	6 antennas supporting 600–6000 MHz

The image shows the back of a smartphone with its internal components exposed. The components are labeled with red text and arrows. The labels include:

- Power Supply**: Located at the top left, near the 5V_DC input.
- DC-DC Converter**: Located below the Power Supply, near the U0202 and U0203 components.
- USB Micro-B**: Located on the left side, near the J0601 connector.
- USB Type-C**: Located on the left side, near the J0601 connector.
- USB Type-B**: Located on the left side, near the J0601 connector.
- 5G M.2 Module**: A large yellow component in the center, labeled J0101.
- SIM1 Card**: Located on the left side, near the J0701 connector.
- SIM2 Card**: Located on the left side, near the J0702 connector.
- Earphone**: Located on the left side, near the J0801 connector.
- Handset**: Located at the bottom left, near the J0802 connector.
- CODEC/SLIC Module**: Located at the bottom center, near the J0803 connector.
- WLAN/ETH Module**: Located at the bottom center, near the J0501 and J0502 connectors.
- Antennas**: Five antennas labeled ANT0 through ANT5 are located on the right side, connected to various connectors (J1001 through J1012).

The components are mounted on a black printed circuit board (PCB) with various connectors, capacitors, and other electronic components visible.

Figure 1: Top View and Component Placement of the EVB

Table 3: Interfaces and Components of the EVB

Function	RefDes	Description
Power Supply	J0202	<ul style="list-style-type: none"> ● The power jack on the EVB ● Typical supply voltage: 5 V / 3 A
	J0601	<ul style="list-style-type: none"> ● USB Type-C interface ● Typical supply voltage: 5 V
M.2 Interface	J0101	Standard PCI Express M.2 interface
USB	J0601	<ul style="list-style-type: none"> ● USB Type-C interface ● Used for the USB 2.0 & 3.0 communication
USB-TO-UART	J0901	USB Micro-B used to convert debug UART to USB 2.0 signal
	J0902	Used to connect module's DBG_TXD and DBG_RXD to the EVB
(U)SIM Interfaces	J0701	<ul style="list-style-type: none"> ● (U)SIM1 interface: Class B (3.0 V) and Class C (1.8 V) ● Support (U)SIM card insertion detection
	J0702	<ul style="list-style-type: none"> ● (U)SIM2 Interface: Class B (3.0 V) and Class C (1.8 V) ● Support (U)SIM card insertion detection
WLAN/Ethernet Interfaces	J0501/J0502	Support AF50T WLAN or RTL8111H/RTL8125 Ethernet
Audio Connector	J0803	Support ALC5686 codec board or LE9643 SLIC board
Earphone Interface	J0801	<ul style="list-style-type: none"> ● 3.5 mm earphone interface ● Used to test the analog audio function of codec module
Handset Interface	J0802	<ul style="list-style-type: none"> ● RJ11-4P handset interface ● Used to test the analog audio function of SLIC module

NOTE

1. See **Chapter 3.2** for the details of switches and button (S0201/S0101/S0102/S0301/S1101), and LED indicators (D0107/D0108).
2. See **Chapter 3.10** for the details of test points of the EVB.
3. J0401 (USB Type-B Interface) is for Quectel internal use only.

2.3. EVB Kit Accessories

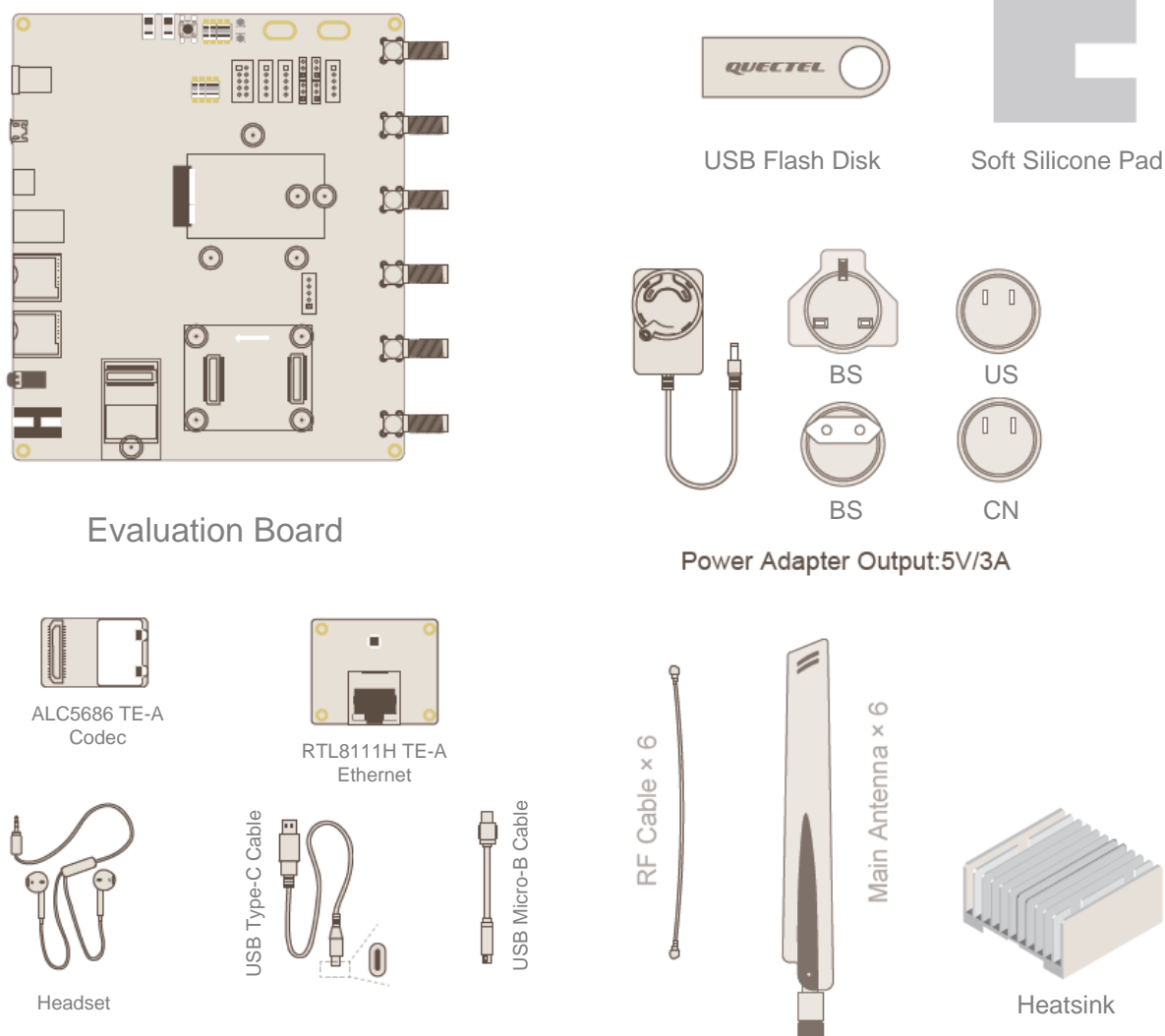


Figure 2: 5G-M2 EVB Kit Accessories

Table 4: Accessory List

Items	Description	Quantity (pcs)
Power adapter	AC-DC power adapter (5 V/ 3 A)	1
Cables	USB Micro-B cable	1
	USB Type-C cable	1
	Sub-6 GHz RF cables	6

Antennas	Sub-6 GHz antennas	6
USB Flash Disk	8 GB USB flash disk	1
Earphone	3.5 mm earphone	1
ALC5686 TE-A	Codec module	1
RTL8111H TE-A	Ethernet module	1
Soft Silicone 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

3 Interface Application

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

- Power supply (J0202/J0601)
- Switches, button and status indicators
- M.2 interface (J0101)
- USB Type-C interface (J0601)
- USB-TO-UART interface (J0901/J0902)
- (U)SIM interfaces (J0701/J0702)
- Audio interfaces (J0801/J0802/J0803)
- PCIe interface to WLAN/Ethernet Module (J0501/J0502)
- Antenna interfaces
- Test points

3.1. Power Supply (J0202/J0601)

The EVB can be powered by an external power adapter through the 5 V power jack (J0202) or USB Type-C receptacle (J0601) on the EVB.

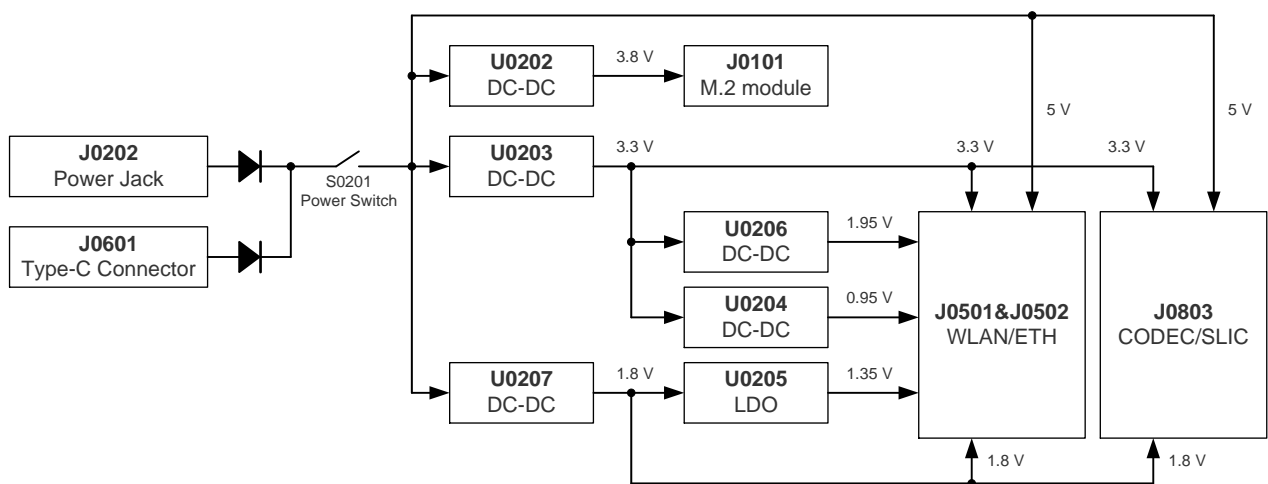


Figure 3: EVB Power Supply Block Diagram

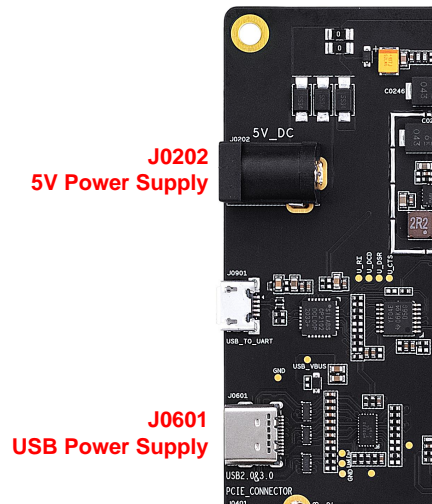


Figure 4: EVB Power Supply Interfaces (J0202/J0601)

3.2. Switches, Button and Status Indicators

The EVB provides four switches (S0101/S0201/S0301/S1101), one button (S0102), and two indicators (D0107/D0108), as shown in the following figure.

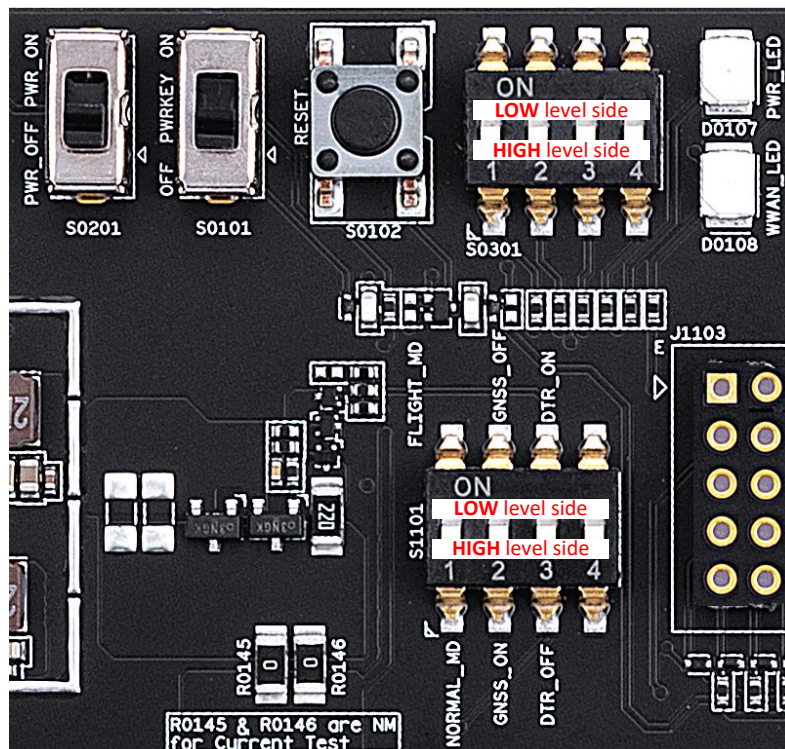


Figure 5: Switches, Button and Status Indicators

Table 5: Description of Switches, Button and Status Indicators

RefDes		Function Description
S0201		Used to power on/off the EVB and module
S0101		Used to turn on/off the module
S0102		Used to reset the module
S0301	S0301.1	<ul style="list-style-type: none"> ● LOW: the module's Pin 38 and 68¹ are connected to J0803 SLIC TE-A ● HIGH: the module's Pin 38 and 68¹ are connected to J0803 CODEC TE-A
	S0301.2	<ul style="list-style-type: none"> ● LOW: the module's Pin 20, 22, 24, and 28 are connected to J0501 and J0502 ● HIGH: the module's Pin 20, 22, 24, and 28 are connected to J0803
	S0301.3	Quectel internal use only
	S0301.4	<ul style="list-style-type: none"> ● LOW: the module's PCIe is connected to J0401 USB Type-B Connector ● HIGH: the module's PCIe is connected to J0501 and J0502
S1101	S1101.1	Used to turn on/off airplane mode <ul style="list-style-type: none"> ● LOW (FLIGHT_MD): turn on airplane mode ● HIGH (NORMAL_MD): turn off airplane mode
	S1101.2	Used to enable/disable GNSS function <ul style="list-style-type: none"> ● LOW (GNSS_OFF): disable GNSS function ● HIGH (GNSS_ON): enable GNSS function
	S1101.3	Quectel internal use only
	S1101.4	Reserved
D0107		Power on/off status indicator (PWR_LED) for the module <ul style="list-style-type: none"> ● Light on: the module is powered on ● Light off: the module is powered off
D0108		RF status indicator (WWAN_LED) for the module <ul style="list-style-type: none"> ● Light on: RF function is enabled ● Light off: RF function is disabled

3.3. M.2 Interface (J0101)

The M.2 interface (J0101) is designed to mount applicable modules. This interface allows engineers to easily test functionalities or develop applications based on the module.

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

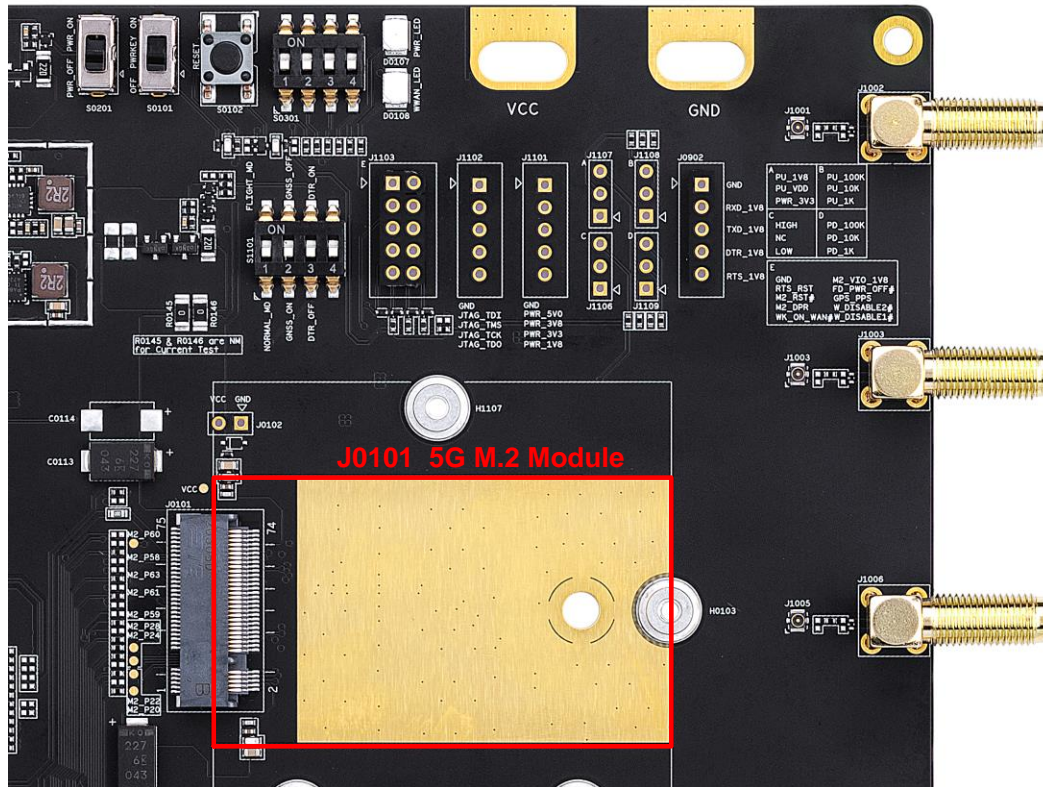


Figure 6: M.2 Connector of the EVB

3.4. USB Type-C Interface (J0601)

The EVB provides a USB 2.0&3.0 Type-C interface (J0601) for the connection with a host. J0601 can be used for data transmission. Also, it can be used as power supply interface to power on the EVB.

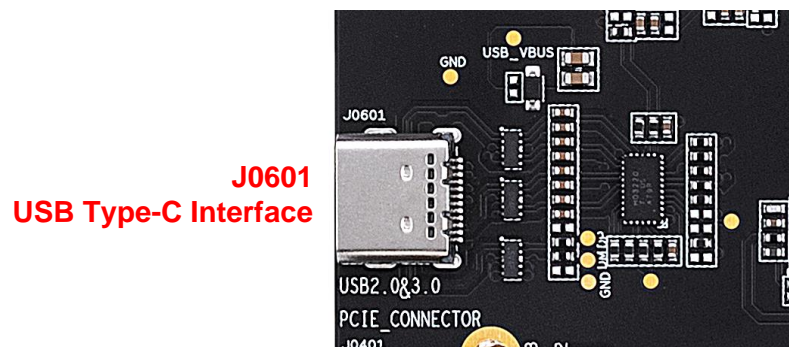


Figure 7: USB Type-C Interface (J0601)

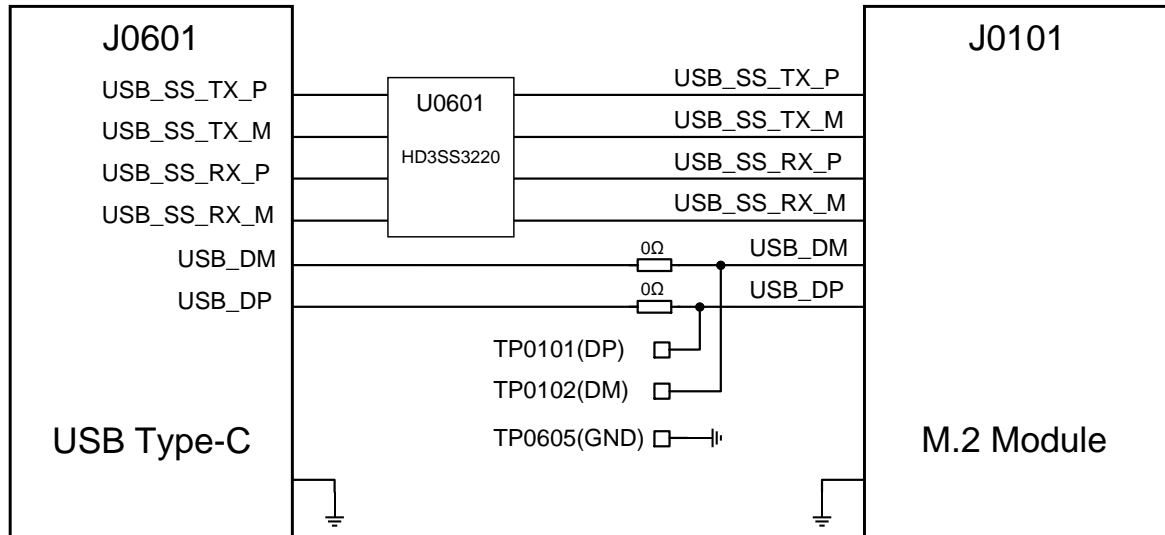


Figure 8: Block Diagram of Connections Between the Module and the USB Type-C Interface

3.5. USB-TO-UART Interface (J0901/J0902)

The EVB provides a USB-TO-UART interface (J0901/J0902). This interface is used for Linux console and converting debug log UART signal to USB 2.0 signal.

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. A connection example of RM500Q-GL module is shown as below.

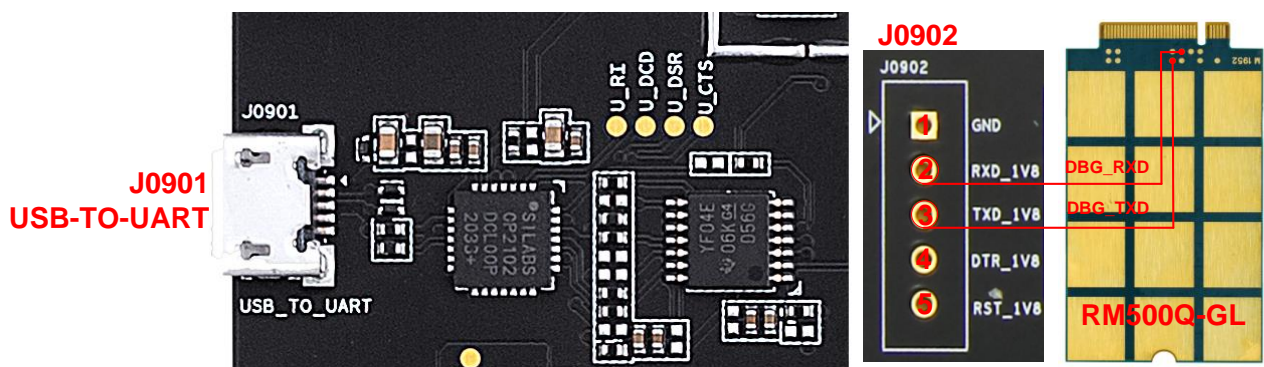


Figure 9: USB-TO-UART Interface (J0901/J0902)

3.6. (U)SIM Interfaces (J0701/J0702)

The EVB has two 8-pin push-push type Micro (U)SIM card connectors (J0701/J0702), which can be used for applicable modules.

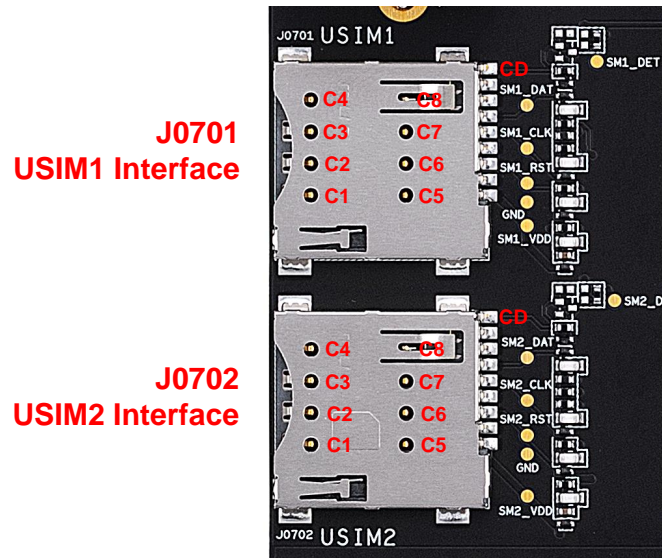


Figure 10: Pin Assignments of (U)SIM Interfaces (J0701/J0702)

Table 6: 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
C4	RESERVED	-	Not connected
C5	GND	-	Ground
C6	VPP	-	Not connected
C7	USIM_DATA	DIO	(U)SIM card data
C8	RESERVED	-	Not connected
CD	USIM_DET	DI	(U)SIM card detection

3.7. Audio Interfaces (J0801/J0802/J0803)

The EVB provides one digital audio codec board connector (J0803), two analog audio connectors (J0801/J0802). This chapter gives a detailed introduction on these audio interfaces.

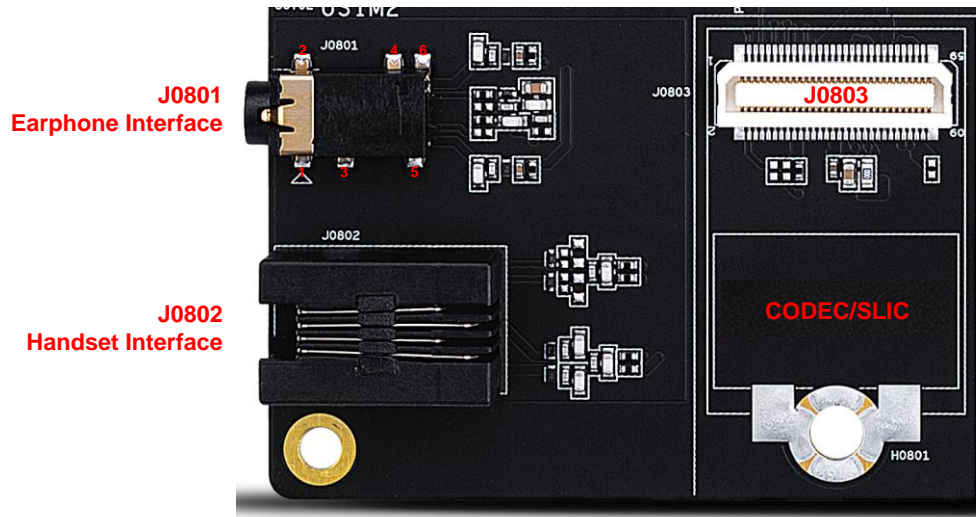


Figure 11: Audio Interfaces of the EVB (J0801/J0802/J0803)

3.7.1. Digital Audio Interface (J0803)

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).

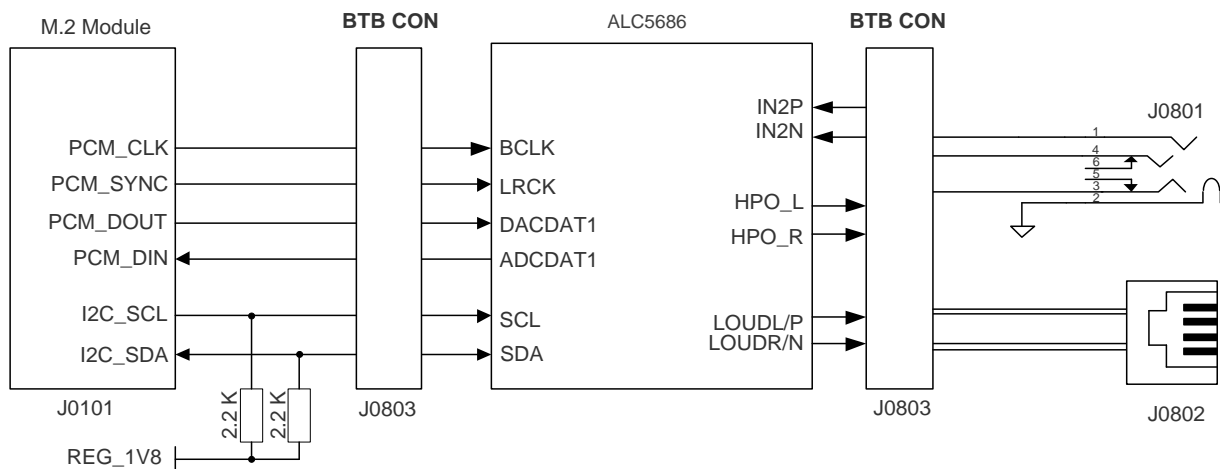


Figure 12: Block Diagram of the Connection Between the Codec TE-A and the Module

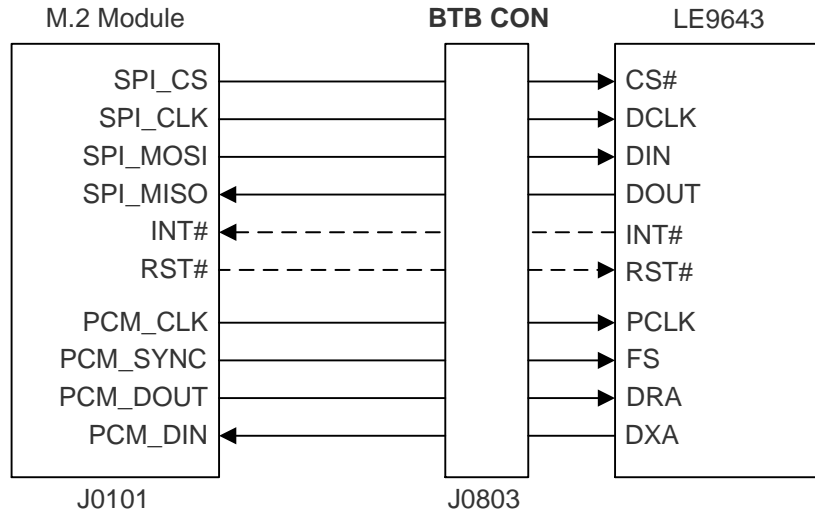


Figure 13: Block Diagram of the Connection Between the SLIC TE-A and the Module

3.7.2. Analog Audio Interfaces (J0801/J0802)

3.7.2.1. Earphone Interface (J0801)

The audio interface J0801 is designed for earphones. A schematic of the interface is shown by the following figure.

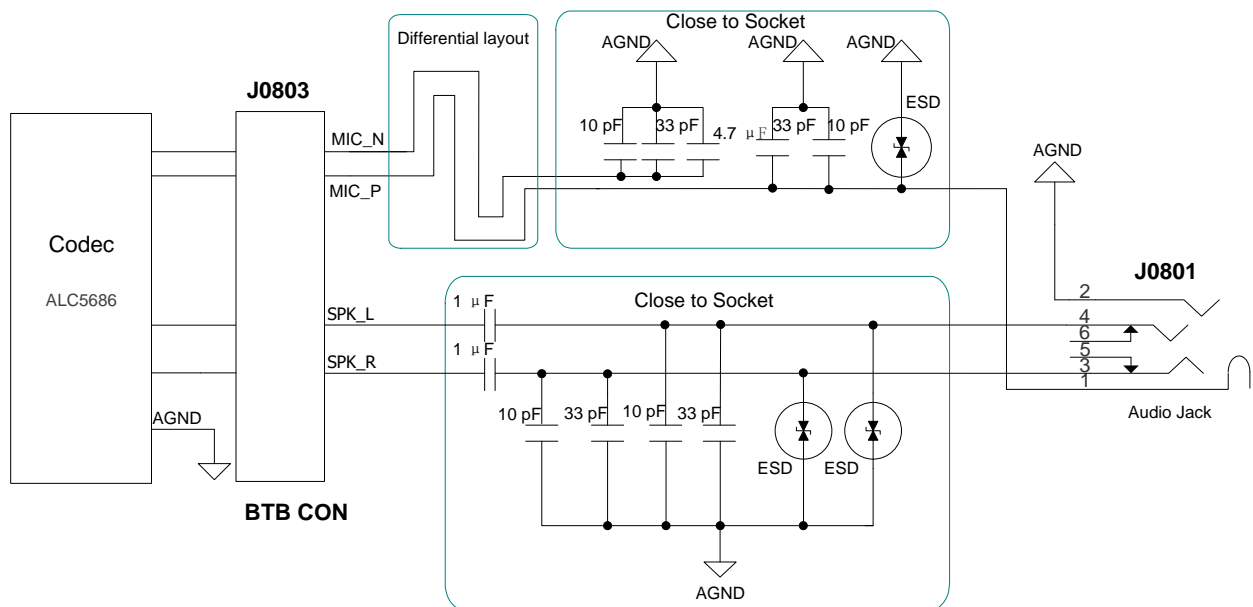


Figure 14: Schematic of Earphone Interface (J0801)

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

Table 7: Pin Definition of Earphone Interface (J0801)

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.

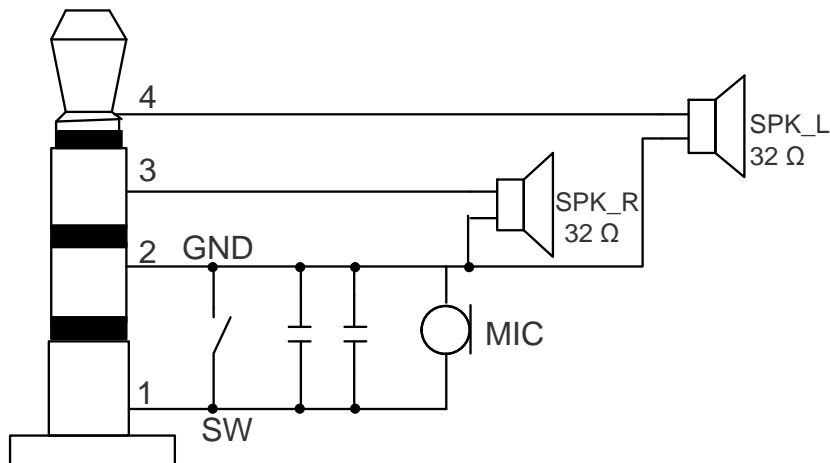


Figure 15: Reference Design for the Audio Plug

3.7.2.2. Handset Interface (J0802)

The audio interface J0802 is designed for handsets. A schematic of the interface is shown below.

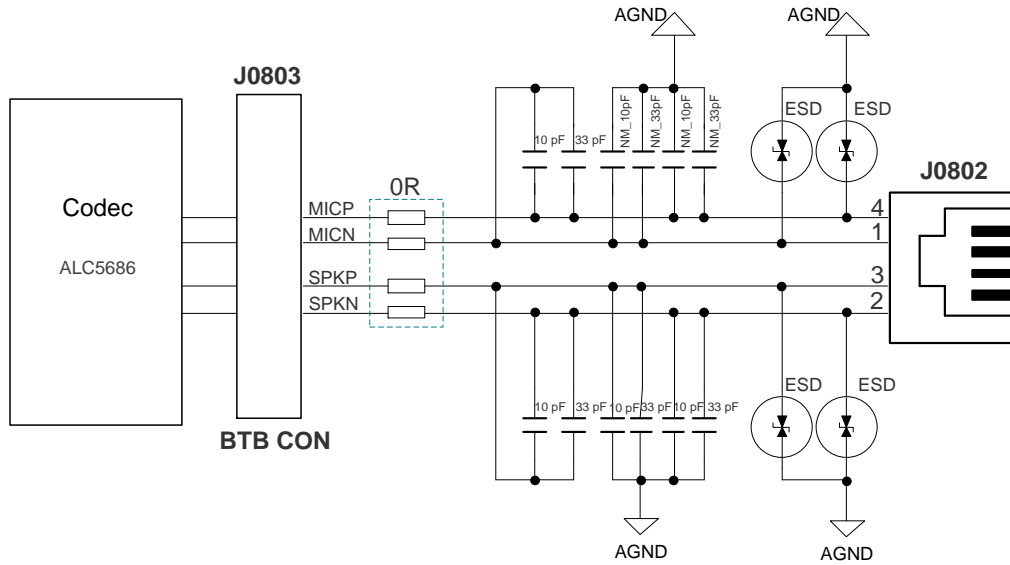


Figure 16: Schematic of Handset Interface (J0802)

3.8 PCIe Interface to WLAN/Ethernet Module (J0501/J0502)

The EVB supports a PCIe interface to connect with PC or WLAN/Ethernet module:

- If S0301.4 (PCIE_SEL) signal is set to **LOW** level side, the PCIe interface of the M.2 module will be connected to Type-B interface (J0401) for communication with a PC (Quectel internal use only).
- If S0301.4 (PCIE_SEL) signal is set to **HIGH** level side, the PCIe interface of the M.2 module will be connected to WLAN/Ethernet module (J0501/J0502).

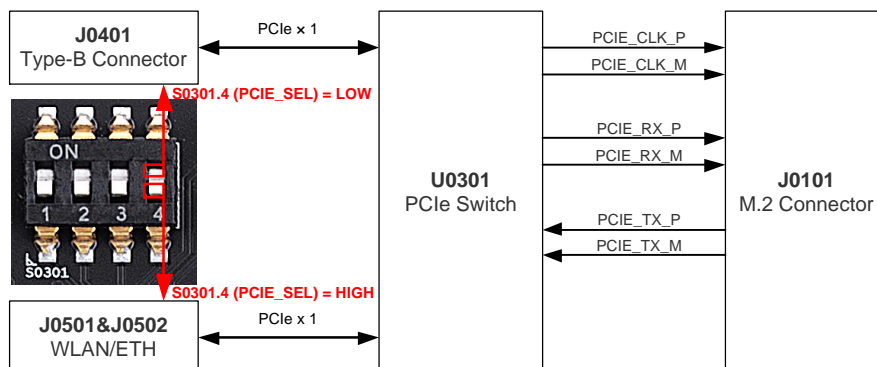


Figure 17: PCIe Interface Block Diagram

The EVB supports AF50T TE-A and RTL8111H/RTL8125 TE-A. The TE-A is connected to the EVB via BTB connectors J0501 and J0502. The connectors allow engineers to easily test the WLAN and Ethernet function of the module. The connection and function verification steps for Ethernet are shown below:

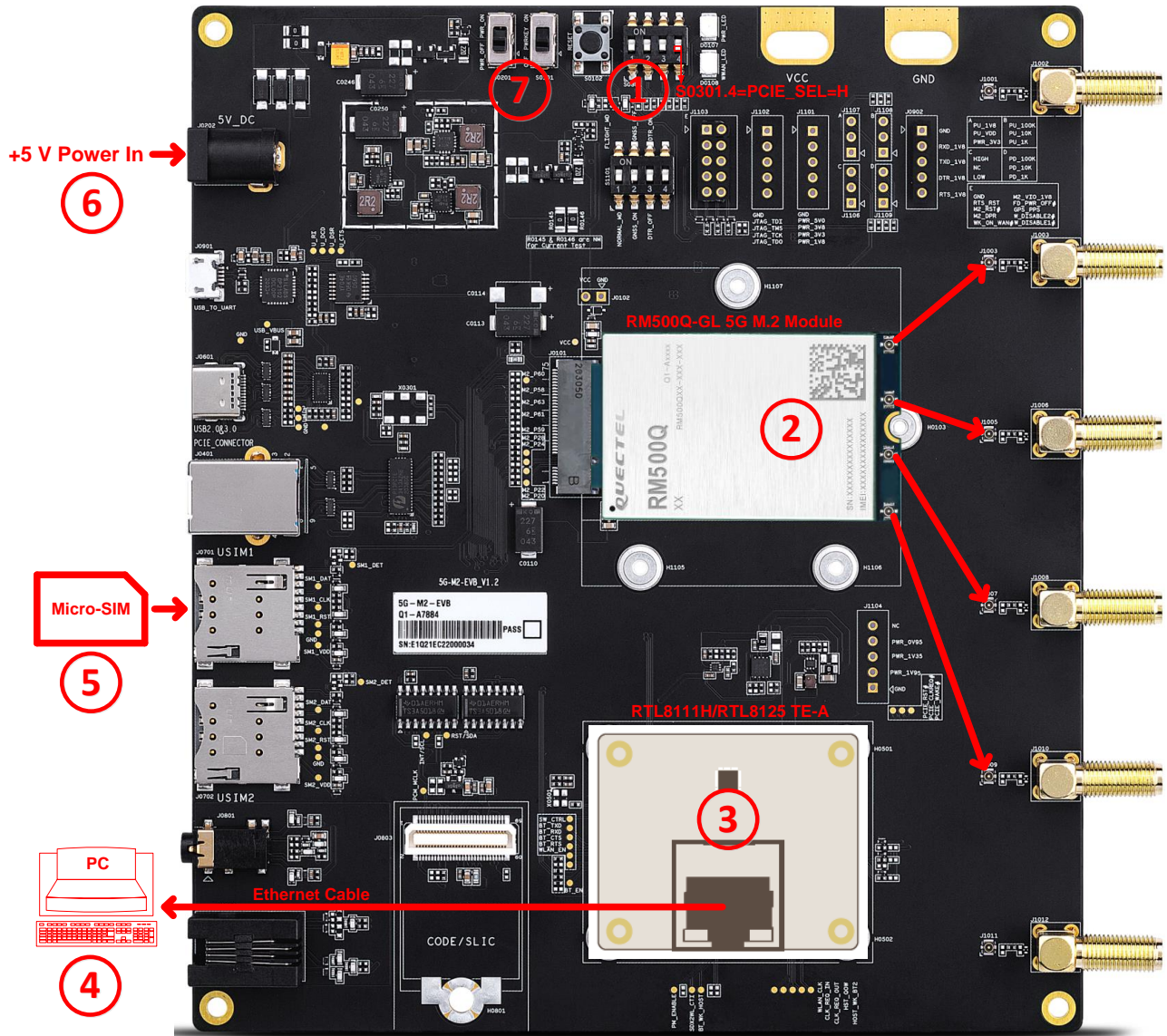


Figure 18: Connections Between the EVB and a PC via Ethernet

Functional verification steps:

1. Set S0301.4 (PCIE_SEL) 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.

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.

3. Insert the RTL8111H TE-A into the BTB connector (J0501, J0502).
4. Connect the EVB and PC with an Ethernet cable.
5. Insert a Micro-SIM card into the USIM1 connector (J0701).
6. Connect the AC-DC power adapter (5 V/ 3 A) between an AC power source and the power jack (J0202).
7. Switch S0201 to **PWR_ON** side and S0101 to **PWRKEY_ON** side to power on the whole EVB and turn on the module.
8. Until the green LED on RTL8111H TE-A blinks, it shows that the Ethernet PHY works normally.

3.9. 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, as shown in **Figure 1**.

3.10. 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.

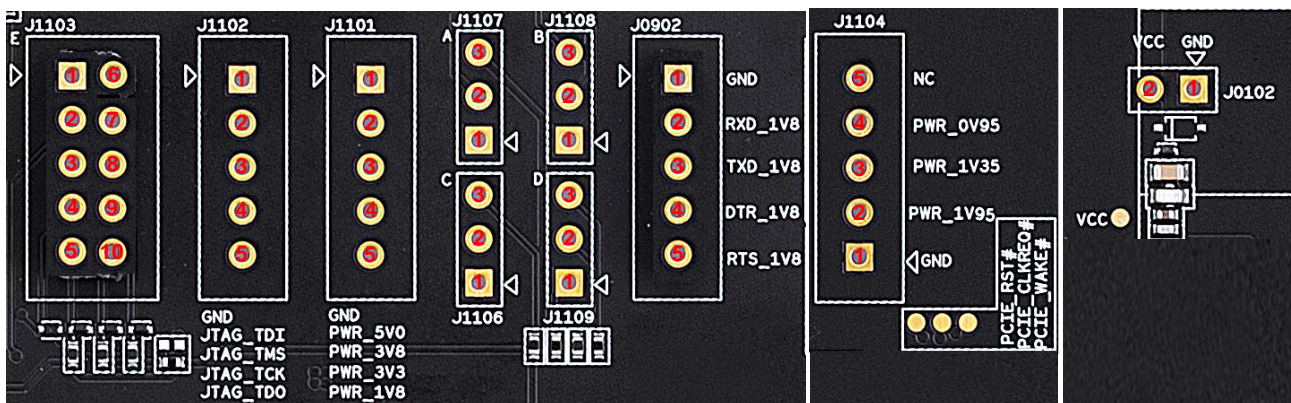


Figure 19: Test Points of the EVB

Table 8: Description of Test Points

RefDes		Pin Name ³	Description
J0102	J0102.1	GND	Ground
	J0102.2	VCC	M.2 module (Pin 2, 4, 70, 72, 74) power supply
J1101	J1101.1	GND	Ground
	J1101.2	PWR_5V0	5 V power supply
	J1101.3	PWR_3V8	3.8 V power supply of DC-DC U0202
	J1101.4	PWR_3V3	3.3 V power supply of DC-DC U0203
	J1101.5	PWR_1V8	1.8 V power supply of DC-DC U0207
J1104	J1104.1	GND	Ground
	J1104.2	PWR_1V95	1.95 V power supply of DC-DC U0206
	J1104.3	PWR_1V35	1.35 V power supply of LDO U0205
	J1104.4	PWR_0V95	0.95 V power supply of DC-DC U0204
	J1104.5	NC	Not connected
J0902	J0902.1	GND	Ground
	J0902.2	RXD_1V8	DEBUG_UART_RXD_1V8
	J0902.3	TXD_1V8	DEBUG_UART_TXD_1V8
	J0902.4	DTR_1V8	DEBUG_UART_DTR_1V8
	J0902.5	RTS_1V8	DEBUG_UART_RTS_1V8
J1103	J1103.1	GND	Ground
	J1103.2	RTS_RST	Quectel internal use only
	J1103.3	M2_RST#	M.2 module Pin 67, reset signal
	J1103.4	M2_DPR	M.2 module Pin 25, dynamic power reduction signal
	J1103.5	WK_ON_WAN#	M.2 module Pin 23, a signal to wake up the host

³ Pin definitions might be different among applicable modules, please contact Quectel Technical Support in case of a different pin definition.

	J1103.6	RFFE_VIO_1V8	M.2 module Pin 65, a 1.8 V power output usually*
	J1103.7	FULL_CARD_POWER_OFF#	M.2 module Pin 6, used to turn on/off the module
	J1103.8	GPS_PPS	M.2 module Pin 56, depend on the pin function of module
	J1103.9	W_DISABLE2#	M.2 module Pin 26, GNSS disable control signal
	J1103.10	W_DISABLE1#	M.2 module Pin 8, airplane mode control signal
J1102	-	-	Quectel internal use only
J1106	-	-	Quectel internal use only
J1107	-	-	Quectel internal use only
J1108	-	-	Quectel internal use only
J1109	-	-	Quectel internal use only

4 Operation Procedures

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

NOTE

Please note that all EVB kit accessories and the applicable module should be assembled BEFORE the EVB is powered on to avoid any damages.

4.1. 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, refer to **document [1]**.
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 the 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 on, indicating that the EVB powers on. 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.

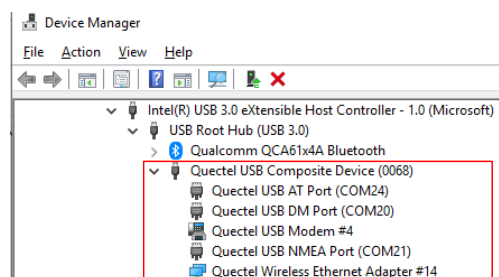


Figure 20: USB Device Exhibited in Device Manager

4.2. Communication via USB

1. Turn on the module according to the procedure in **Chapter 4.1**.
2. Install and then open the communication tool QCOM provided by Quectel.
3. Select correct “COM Port” (the port number of USB AT Port, e.g., “COM24” as exemplified in **Figure 20**) and “Baudrate” (such as 115200 bps), and then click “Open Port”. For more details about the usage of QCOM, refer to **document [2]**.

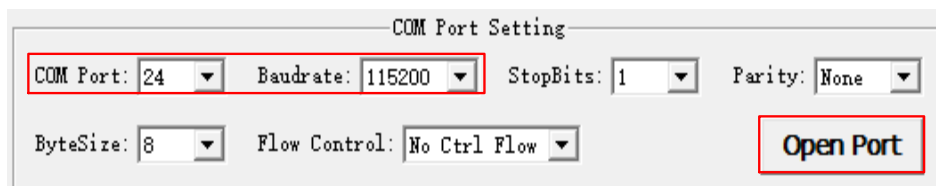


Figure 21: COM Port and Baudrate Configurations

4. After the port opens successfully, you can start the communication with the module via USB. Send AT commands by QCOM, and you will get responses from the module, as shown by the following figure. For detailed AT commands, see **document [3]**.

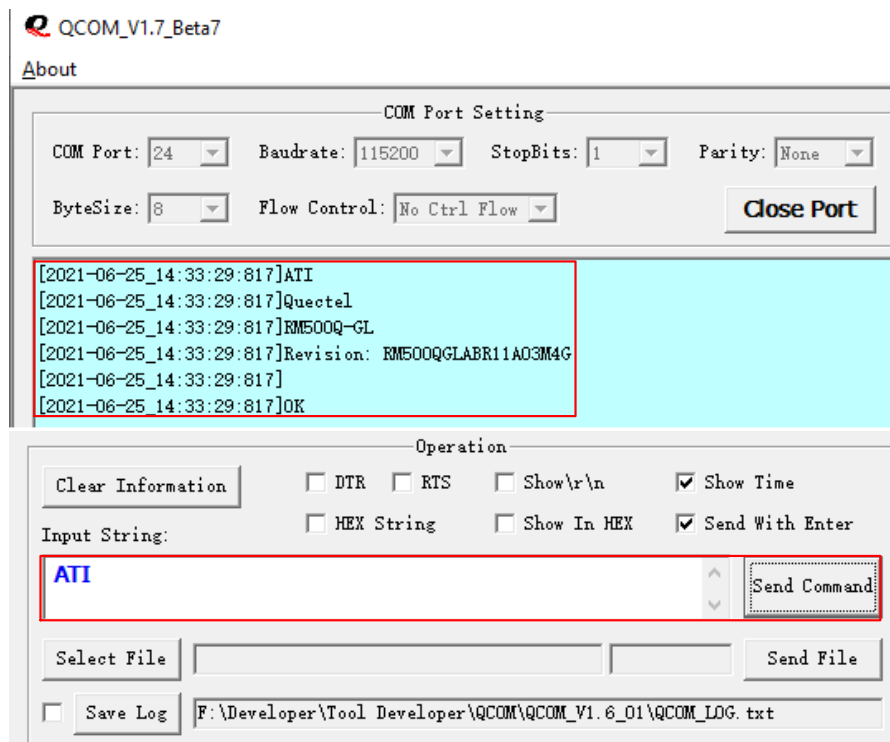


Figure 22: Example of an AT Command

4.3. Firmware Upgrade

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

1. Power on the module according to the procedures in **Chapter 4.1**.
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” as exemplified in **Figure 20**) and select “**Baudrate**”, as illustrated by the following figure.

The screenshot shows the 'Upgrade FW' window in the QFlash tool. It has a 'Config' section with a 'Load FW Files' button, a 'COM Port' dropdown set to '20', and a 'Baudrate' dropdown set to '115200'. Below this is a table with two columns: 'Name' and 'Location'. The table contains four rows of firmware files, all of which are checked. At the bottom of the window, there is a warning message: 'Do not remove USB or terminate the downloading process before it completes.' and a large 'Start' button.

Name	Location
<input checked="" type="checkbox"/> File_Path	D:\RM500QGLABR11A03M4G_01.001.01.001\update\firehose
<input checked="" type="checkbox"/> prog_firehose_sdx55...	D:\RM500QGLABR11A03M4G_01.001.01.001\update\firehose\prog_firehose_sdx55.mbn
<input checked="" type="checkbox"/> rawprogram_nand_p4...	D:\RM500QGLABR11A03M4G_01.001.01.001\update\firehose\rawprogram_nand_p4K_b256K_update.xml
<input checked="" type="checkbox"/> patch_p4K_b256K.xml	D:\RM500QGLABR11A03M4G_01.001.01.001\update\firehose\patch_p4K_b256K.xml

Figure 23: 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 [4]**.

4.4. Reset the Module

Press the RESET button (S0102) to reset the module. But the reset option is only used in case of emergency. For example, the software does not respond for more than 5 s due to some serious problems.

NOTE

Pressing the RESET button (i.e., triggering the RESET# signal) will lead to loss of all data in the modem and removal of system drivers. It will also disconnect the modem from the network.

4.5. Turn Off the Module

There are two methods to turn off the module.

- Hardware method: switch S0201 to **PWR_OFF** side to turn off the module.
- Software method: send **AT+QPOWD** command to turn off the module, which is preferred and safer since the module will log off from the network and save data before shutdown.

NOTE

Please refer to *document [3]* for more details about **AT+QPOWD** command.

4.6. Current Consumption Test

The EVB can also be used to test the current consumption of the module after being modified and operated by the following steps.

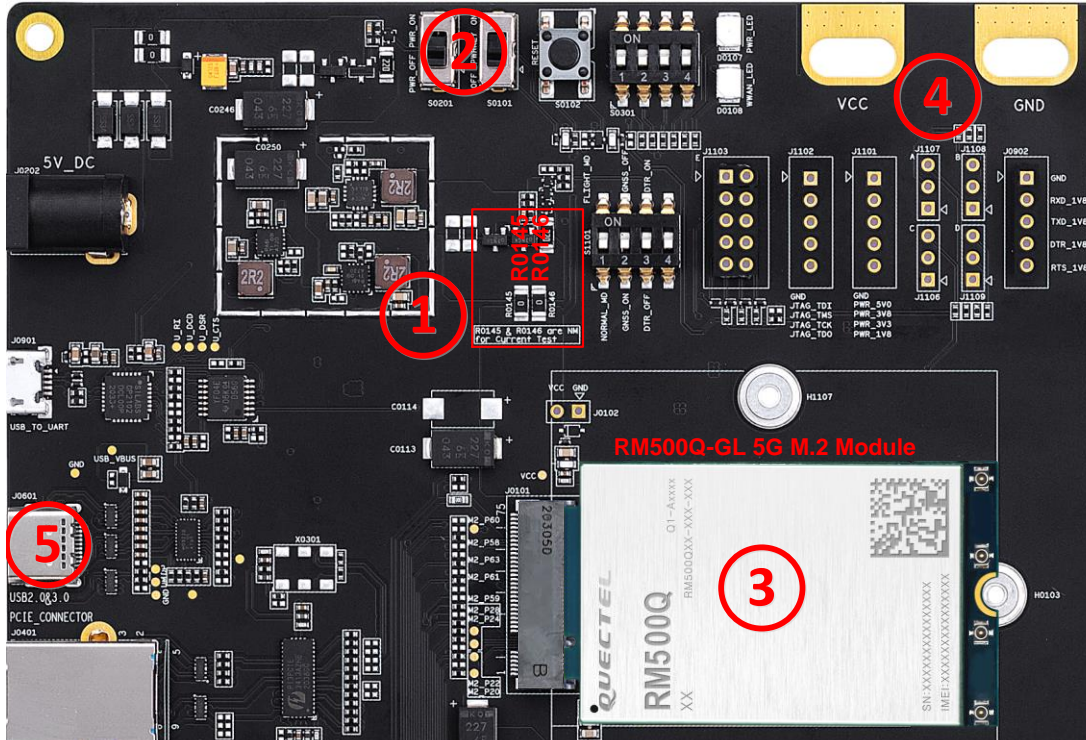


Figure 24: Modifications and Configurations for Current Consumption

1. Disconnect or remove R0145 and R0146.
2. Set the power switch (S0201) to the **PWR_ON** or **PWR_OFF** side, and set PWRKEY (S0101) to the **ON** side. Please note that you will get the current consumption of the module in sleep mode at USB 3.0 when S0201 is on the **PWR_ON** side and that in sleep mode at USB 2.0 when S0201 is on the **PWR_OFF** side.
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 by the reference designators, VCC and GND, on the edge of the board to power the module independently. Then turn on the external power supply, and the module will turn on.
5. Connect the USB interface (J0601) to the USB 3.0 interface of a PC.
6. Send **AT+QSCCLK=1** and **AT+CFUN=0** to enable the module to enter sleep mode. After the module enters sleep mode, you can test the current consumption from the external power supply.

5 Appendix References

Table 9: Related Documents

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

Table 10: 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
