

Smart EVB User Guide

Smart Module Series

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History

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1 Introduction

This document describes the evaluation board of Quectel's smart module series. The smart evaluation board is an assistant system integrator for developing and evaluating products based on Quectel smart modules.

1.1. Safety Information

The following safety precautions must be observed during all phases of the operation, such as usage, service or repair of any cellular terminal or mobile incorporating module. Manufacturers of the cellular terminal should send the following safety information to users and operating personnel and to incorporate these guidelines into all manuals supplied with the product. If not so, Quectel does not take on any liability for customer failure to comply with these precautions.



Full attention must be given to driving at all times in order to reduce the risk of an accident. Using a mobile while driving (even with a handsfree kit) cause distraction and can lead to an accident. You must comply with laws and regulations restricting the use of wireless devices while driving.



Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it switched off. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. Consult the airline staff about the use of wireless devices on boarding the aircraft, if your device offers a Fight Mode which must be enabled prior to boarding an aircraft.



Switch off your wireless device when in hospitals or clinics or other health care facilities. These requests are desinged to prevent possible interference with sensitive medical equipment.



Cellular terminals or mobiles operate over radio frequency signal and cellular network and cannot be guaranteed to connect in all conditions, for example no mobile fee or an invalid USIM card. While you are in this condition and need emergent help, Please Remember using emergency call. In order to make or receive call, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength.



Your cellular terminal or mobile contains a transmitter and receiver. When it is ON , it receives and transmits radio frequency energy. RF interference can occur if it is used close to TV set, radio, computer or other electric equipment.



In locations with potentially explosive atmospheres, obey all posted signs to turn off wireless devices such as your phone or other cellular terminals. Areas with potentially expositive atmospheres including fuelling areas, below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles such as grain, dust or metal powders.

2 General Overview

Quectel supplies Smart-EVB kit for testing smart modules. This EVB can test basic functionalities of these modules.

2.1. Key Features

Table 1: Features

Features	Implementation
Power Supply	<ul style="list-style-type: none"> ● USB supply 4.75~5.25V, typically 5V ● VBAT: 3.5~4.3V, typically 3.8V
USIM Interface	<ul style="list-style-type: none"> ● Support hot plugging ● Support USIM/SIM cards: 3.0V and 1.8V ● Support dual SIM card (Refer to features of smart module)
Audio Interface	<ul style="list-style-type: none"> ● Analog interface used for loud speaker, microphone, earphone and handset
UART Interface	<ul style="list-style-type: none"> ● Two UART interfaces: Main UART for data communication Debug UART for debug purpose ● Max. baud rate: 460800bps
USB Interface	<ul style="list-style-type: none"> ● USB 2.0, support USB OTG (Refer to features of smart module)
Signal Indication	<ul style="list-style-type: none"> ● 4 LEDs are available for signal indication
Physical Characteristics	<ul style="list-style-type: none"> ● Size: 24 × 18cm

2.2. System Overview

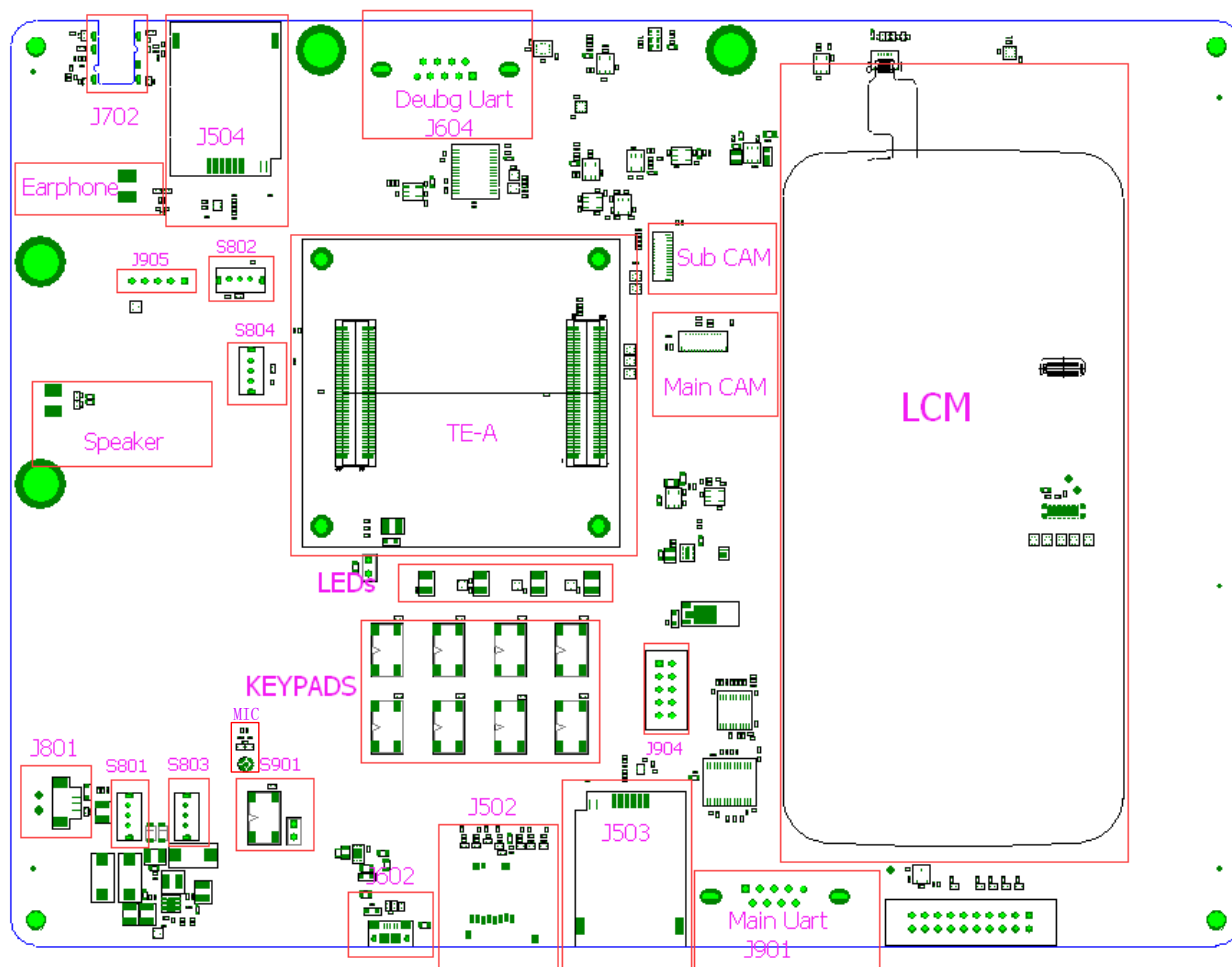


Figure 1: System Overview

2.3. Interface Overview

Table 2: Interfaces of Smart EVB

Interface	Reference Number	Description
Power Supply	J602	USB interface, supply +5V voltage
Power Switch	S803	Control power supply VBAT ON/OFF
PWRKEY	S901	PWRKEY push button It's used to turn on/off the module
Micro USB	J602	USB device interface (Can also be used for power supply)
Audio	Speaker	Used for loud speaker

	Ear phone	Used for earphone
	MIC	Used for microphone
	J702	Used for handset
Main USIM	J503	Main USIM card holder
Sub USIM	J504	Sub USIM card holder
Main UART	J901 (bottom side)	Main UART port
Debug UART	J604 (bottom side)	Debug UART port
LEDs	D805, D806, D807, D808	D805 is network mode indicator D806 is power ON/OFF indicator D807 is net indicator D808 is status indicator
TE-A	J101, J102	Smart TE-A B2B connector
Test Points	TP401, TP402, TP601, TP801, TP802	These are test points

NOTE

Some of these functions may have differences on different smart modules, please refer to Quectel module reference design and hardware design for more details.

2.4. EVB View



Figure 2: EVB Top View

2.5. EVB Accessories

All the items of EVB kit are listed in Table 3 and Figure 3 as below. Please contact the supplier if there is something missing.

Table 3: Accessories List

Items	Description	Quantity
Cables	USB to UART converter cable	1
	USB cable	1

	RF cable	4
	Main Antenna	2
Antennas	WIFI Antenna	1
	GNSS Antenna (passive)	1
Audio	Earphone	1
Disk	USB2.0 to RS232 driver and USB driver disk	1
Others	Bolts and nuts for fixing EVB	1

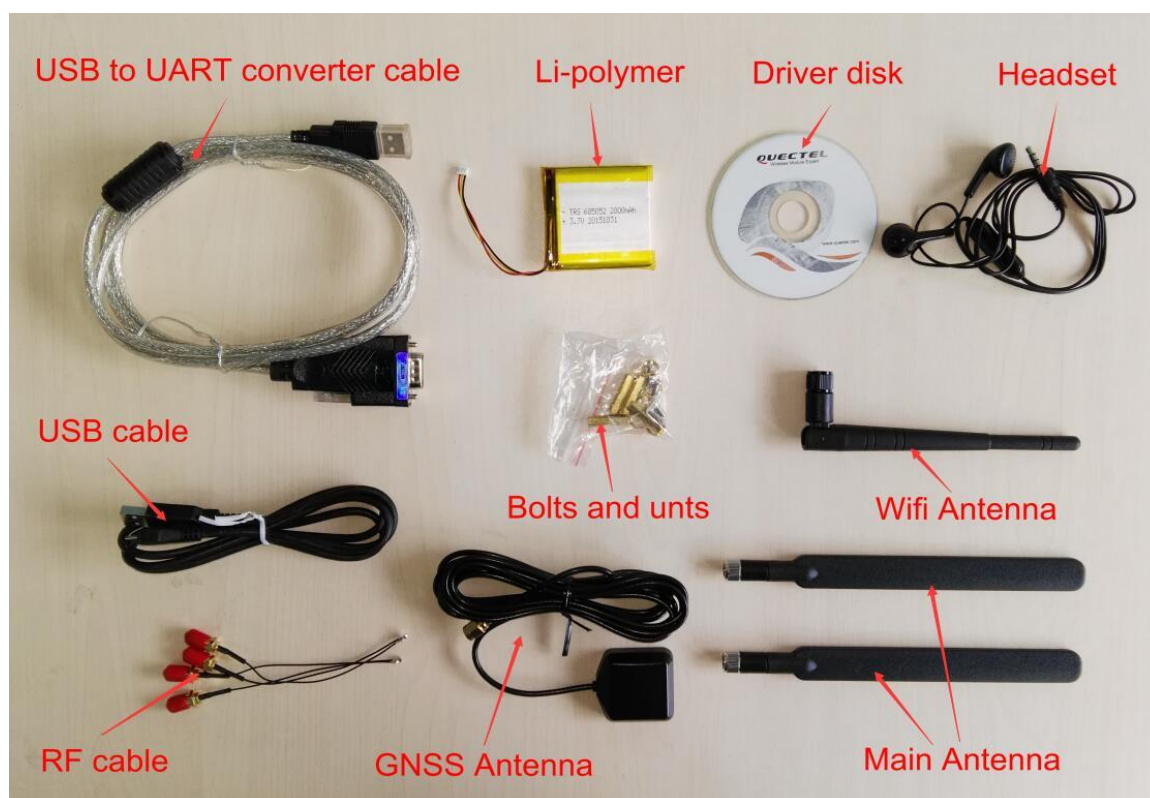


Figure 3: EVB Accessories

NOTE

The main antenna can also be used as diversity reception.

3 Interface Application

This chapter describes the hardware interfaces of smart EVB, shown as follows:

- Power interface
- USB interface
- Audio interface
- USIM card interface
- UART interface

It also provides information about LEDs, buttons and test points to help you use the smart EVB.

3.1. Power Interface

The power supply of smart EVB could come from battery or USB power supply and they can be switched by S801. USB supplies power to EVB through switching USB_VBUS 5V power supply to VBAT by a step down DCDC.

Figure 4 shows the simplified power supply schematic, and Figure 5 shows the power interface of EVB.

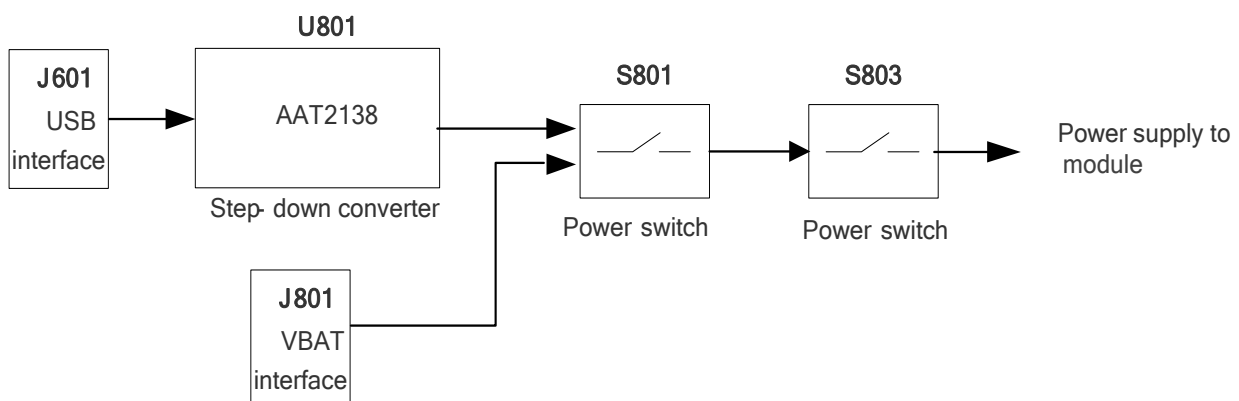


Figure 4: Simplified Power Supply Schematic

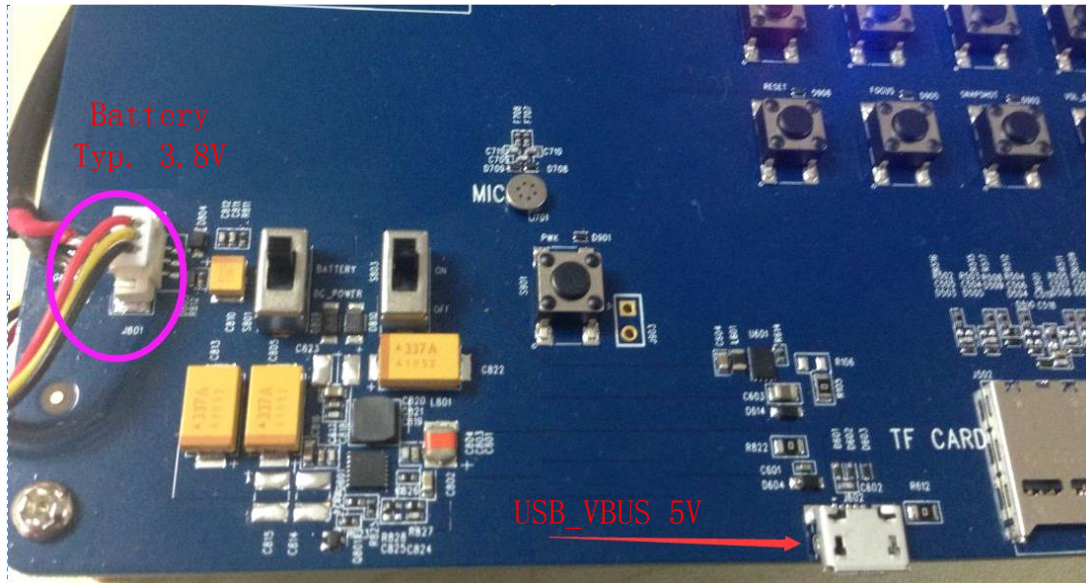


Figure 5: Power Interface

3.2. USB Device Interface

Smart module provides a USB 2.0 interface which complies with USB 2.0 standard and supports high-speed (480Mbps). It is used for AT command, data transmission, firmware upgrade and GNSS NEMA output.

Smart EVB provides a Micro-USB receptacle J602 to connect a host device.

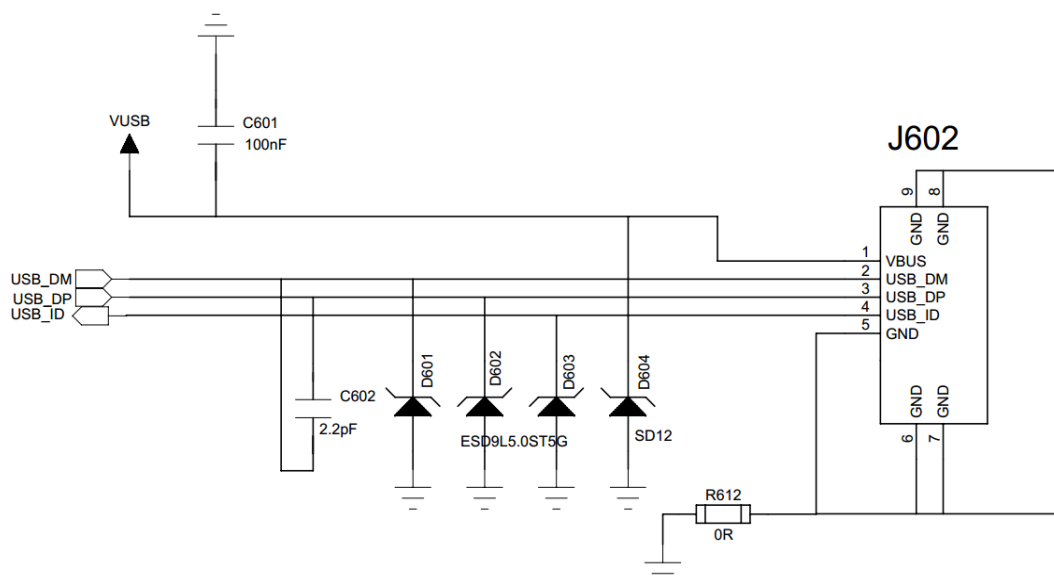


Figure 6: Circuit of USB Interface

Table 4: Pin Assignment of USB Interface

J602 Pin	Pin Name	Function
1	USB_VBUS	USB 5V power supply
2	USB_DM	USB serial differential bus (minus)
3	USB_DP	USB serial differential bus (positive)
4	USB_ID	USB ID identification
5	GND	GND for USB interface

3.3. Audio Interface

Smart EVB provides two uplink audio and three downlink audio interfaces.

- Input: MIC1 and earphone
- Output: louder speaker, earphone and handset

3.3.1. Loud Speaker

The following figure shows the loud speaker circuit.

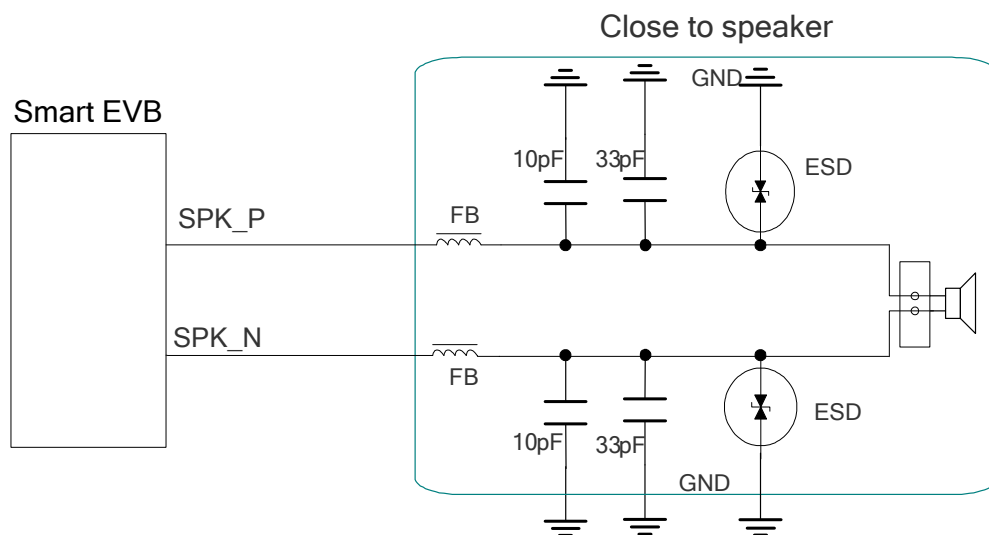


Figure 7: Loud Speaker Circuit

3.3.2. Earphone (J702)

An earphone can be used in audio interface J702. Figure 8 shows the circuit of audio interface J702 for earphone:

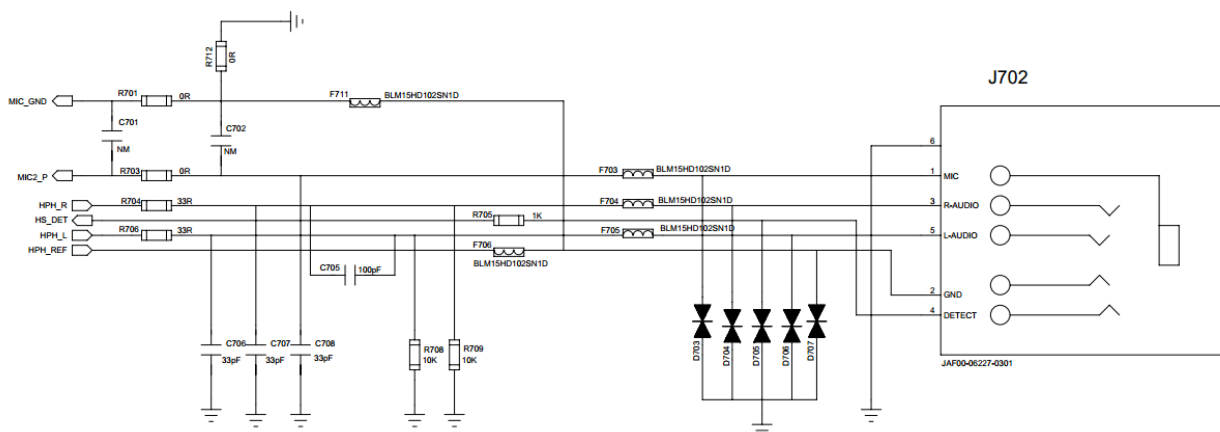


Figure 8: Earphone Circuit

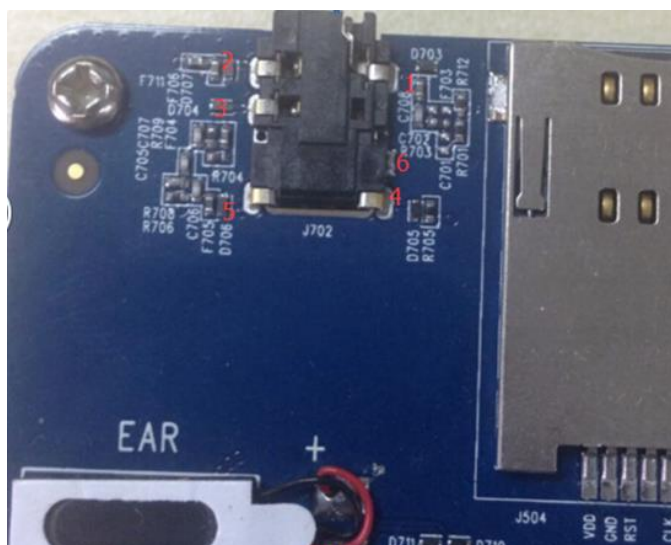


Figure 9: Pin Assignment of J7

Table 5: Pin Assignment of J702

J404 Pin	Pin Name	Function
1	MIC	Positive MIC input

2	GND	Dedicated GND for audio
3	R-AUDIO	Earphone right channel
4	DETECT	Earphone insert detection pin
5	L-AUDIO	Earphone left channel
6	GND	Grounded. Not the audio GND.

The following figure shows the sketch of audio plug, which is American-standard with aperture of 3.5mm.

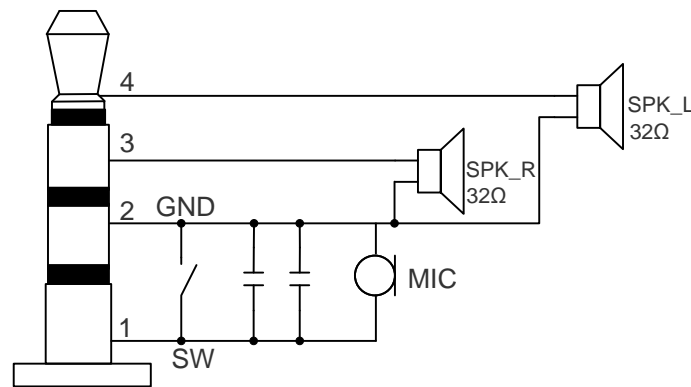


Figure 10: The Sketch of Audio Plug

3.3.3. Microphone and Handset

SMT MIC is used as microphone in interface U701. The following figure shows the microphone and handset circuit.

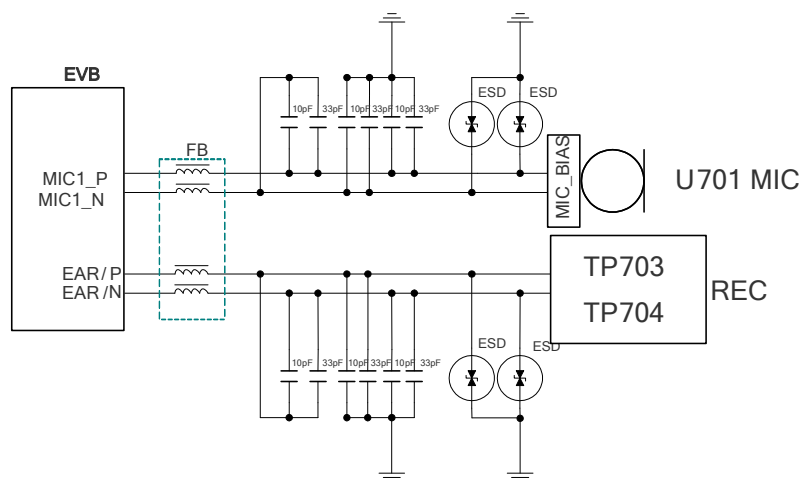


Figure 11: Microphone and Handset Circuit

Table 6: Pin Assignment of Microphone and Handset

Pin No.	Pin Name	Function
1	MIC1_P	Positive microphone input
2	MIC1_N	Negative microphone input
3	EAR/P	Positive handset input
4	EAR/N	Negative handset input

3.4. USIM Card Interface

The smart EVB has two USIM card interfaces. A suitable USIM card (3V or 1.8V) is required to start the module. The following figure shows the simplified interface schematic for J503.

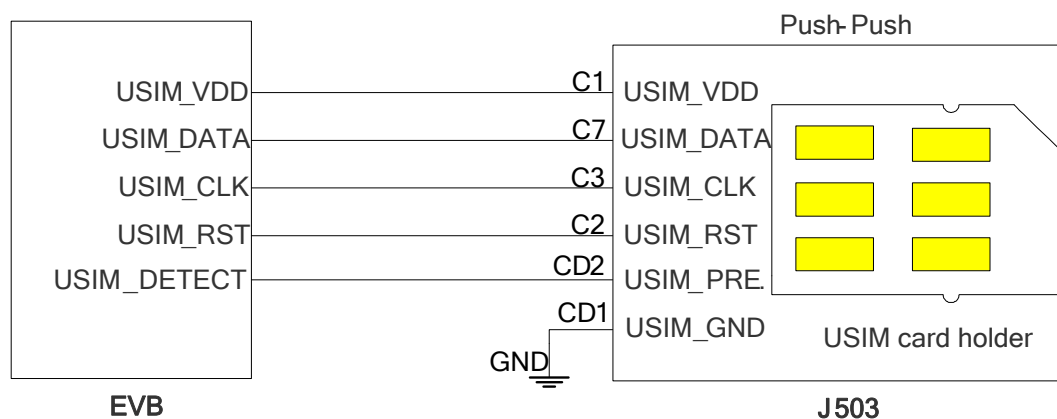


Figure 12: Simplified USIM Card Interface Schematic

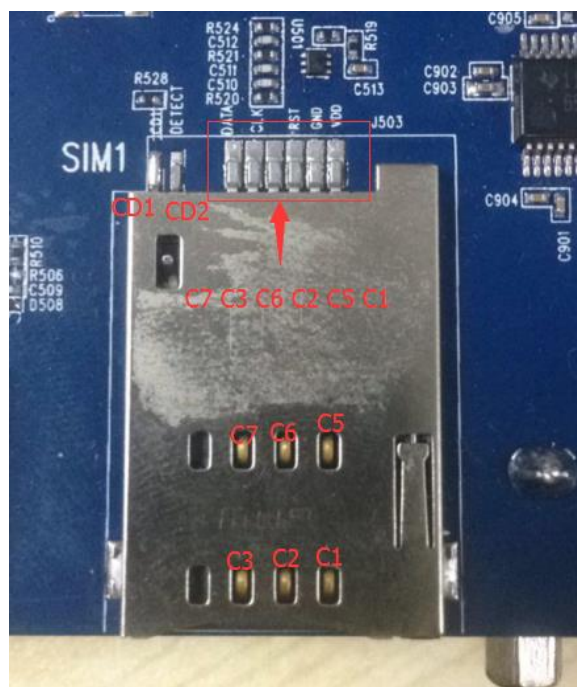


Figure 13: Pins Assignment of USIM Card Holder

Table 7: Pin Assignment of J503

J503 Pin	Signal Name	I/O	Function
C1	USIM_VDD	O	USIM/SIM card power
C2	USIM_RST	O	USIM/SIM card reset
C3	USIM_CLK	O	USIM/SIM card clock
C5	GND	/	Ground
C6	VPP	/	Not connected
C7	USIM_DATA	I/O	SIM data line
CD1	GND	GND	SIM reserved pin
CD2	USIM_PRESENCE	I	USIM card detection

NOTE

The schematic of J504 are the same as that of J503.

3.5. UART Interface

Smart EVB offers two UART interfaces, Main UART port and Debug UART port. The following figure shows the UART block diagram.

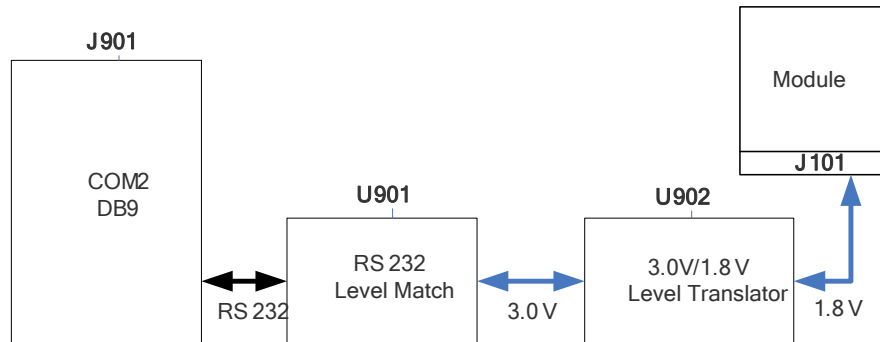


Figure 14: UART Block Diagram

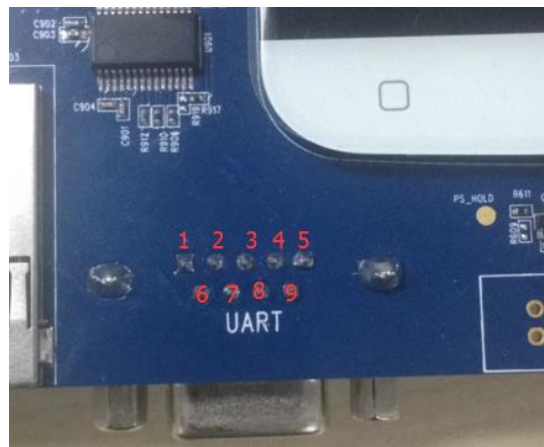


Figure 15: Main UART Port (J901)

Table 8: Pin Assignment of J901

J401 Pin	Signal Name	I/O	Description
1	RS232_DCD	O	Data carrier detection
2	RS232_RXD	I	Receive data
3	RS232_TXD	O	Transmit data
4	RS232_DTR	I	Data terminal ready

5	RS232_GND	/	GND
6	NC	/	Not connected
7	RS232_RTS	I	Request to send
8	RS232_CTS	O	Clear to send
9	RS232_RI	O	Ring indicator

3.6. Switch and Buttons

Smart EVB comprises nine buttons and two switches. Figure 16 shows the switches and buttons.

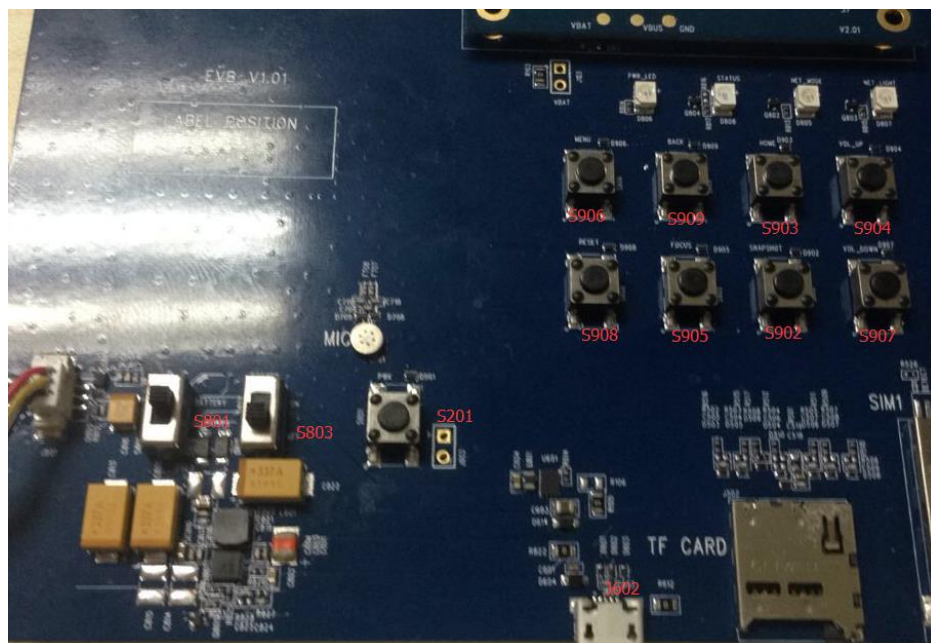


Figure 16: Switches and Buttons

Table 9: Description of Switch and Buttons

Reference	Description
S801	Switch battery and USB power supply
S803	EVB power switch

S901	ON/OFF
S902	Camera
S903	HOME
S904	Volume up
S905	Focus
S906	Menu
S907	Volume down
S908	Reset
S909	Back

3.7. Status LEDs

Smart EVB comprises four status LEDs (D805, D806, D807, D808). Figure 17 shows the position of LEDs.

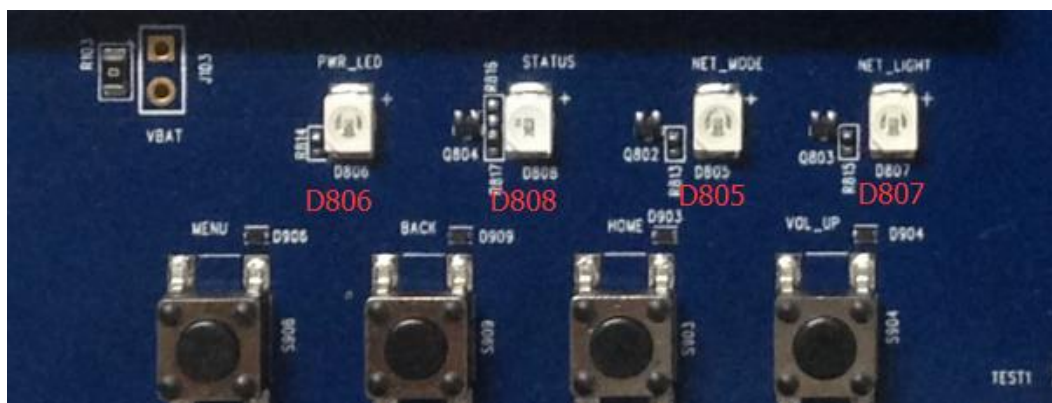


Figure 17: Status LEDs

Table 10: Description of Status LEDs

Reference	Description
D806	Indicate the power supply for module is ready Bright: VBAT ON Extinct: VBAT OFF
D808	Indicate the module operation status

Table 11: Pin Assignment of J904 and J905

J904 Pin	Pin Name	Description
1	TEST1	Reserved test point
2	GND	Ground
3	GPIO_ANT3	Test point, reserved GPIO
4	CTS	Clear to send
5	VREG_L6	LDO6
6	RXD	Receive data
7	NC	Not connected
8	RTS	Request to send
9	VDD_3V3	3.3V voltage output
10	TXD	Transmit data
J807 Pin	Pin Name	Description
1	GPIO_ANT1	Test point, reserved GPIO
2	GPIO_ANT2	Test point, reserved GPIO
3	PWR_EN	Enable DCDC (U801) power or not
4	DTR	Data terminal ready
5	PWR_3V3	Pull up to turn on the module

4 Operation of Smart EVB

4.1. Power On

1. Connect the smart module to the connector J101 and J102 on smart EVB, install battery to J801 and S801 and pull S803 to ON state, then D805 will be bright.
2. Press the S901 for at least 2s. The module will be in the power-on mode and D808 will be bright.
3. Wait for the module to turn on through LCM screen after D808 is bright.

4.2. Power Off

1. Press PWRKEY for 1s when the module is turned on, there will be a prompt about power-off operation on LCM screen.
2. Select “Power off”, the module will begin to power off.
3. If D808 is extinct, it indicates that module is powered off successfully, and S803 can be powered down.

4.3. Communication Via USB or UART Interface

4.3.1. Communication via USB Interface

1. Power on the smart module (Refer to Chapter 4.1).
2. Connect EVB and PC with USB cable through USB interface, install USB driver from the Driver Disk.
3. Select USB AT port and open the port through QCOM tool.
4. Configure AT Command Window and operate the module via AT commands.

4.3.2. Communication via UART Interface

1. Power on the smart module (Refer to Chapter 4.1).
2. Insert USB-to-RS232 cable and install USB-to-RS232 driver from the Driver Disk.

3. Select USB AT port and open the port through QCOM tool.
4. Configure AT Command Window, set correct baud rate (such as 115200bps) and operate the module via AT commands

4.4. Firmware Upgrade

Smart module upgrades firmware via USB port by default, please follow the procedures below to upgrade firmware.

1. Open the firmware upgrade tool “**QEIL**” in the PC and power on the smart module.
2. Click the “**SelectPort**” dropdown list and select the USB port.
3. Select “Flat Build” from “**Select Build Type**”.
4. Select software to load from “**Select Programmer**”.
5. Choose load content to load XML from “**Select Build**”.
6. Click “**Download**” to upgrade the firmware.

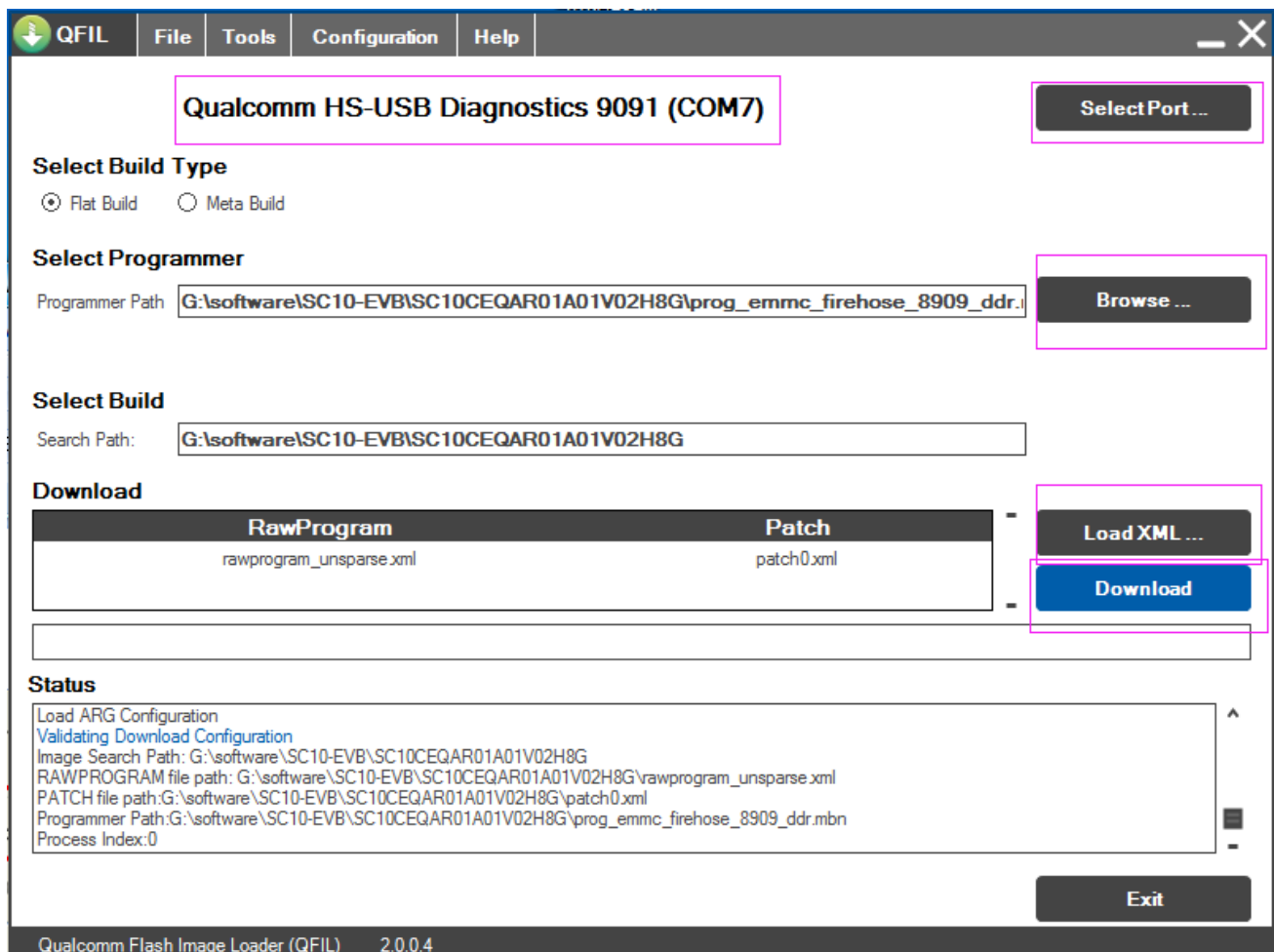


Figure 20: Firmware Upgrade Interface

5 EVB Accessories Assembly



Figure 21: Smart EVB and Accessories Equipment

6 Appendix A Reference

Table 12: Terms and Abbreviations

Abbreviation	Description
LTE	Long Term Evolution
EVB	Evaluation Board
USIM	Universal Subscriber Identity Module
SIM	Subscriber Identity Module
PC	Personal Computer