Smart EVB G2

User Guide

Smart LTE Module Series

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Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.
7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

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1 Introduction

This document describes the evaluation board (Smart EVB G2) for Quectel Smart modules SG30, SG36 and SC60. The smart evaluation board is an assistant tool to develop and test Quectel Smart modules.

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1.1. 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 Smart modules. Manufacturers of the cellular terminal should send the following safety information to users and operating personnel, and incorporate these guidelines into all manuals supplied with the product. If not so, Quectel assumes no liability for customers' 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) causes 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 is switched off. The operation of wireless appliances in an aircraft is forbidden, so as to prevent interference with communication systems. Consult the airline staff about the use of wireless devices on boarding the aircraft, if your device offers an Airplane Mode which must be enabled prior to boarding an aircraft.
	Switch off your wireless device when in hospitals,clinics or other health care facilities. These requests are desinged to prevent possible interference with sensitive medical equipment.
	Cellular terminals or mobiles operating over radio frequency signal and cellular network cannot be guaranteed to connect in all conditions, for example no mobile fee or with an invalid (U)SIM card. While you are in this condition and need emergent help, please remember using emergency call. In order to make or receive a 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 explosive atmospheres include 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, etc.

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2 General Overview

Quectel supplies Smart EVB G2 for designers to develop applications based on Quectel SG30/SG36/SC60 modules. This EVB can test basic functionalities of these modules.

2.1. Key Features

The following table describes the detailed features of Smart EVB G2.

Table 1: Key Features

Features	Implementation
Power Supply	DC power supply: 4.75V~6.0V (typical: 5.0V) VBAT: 3.5V~4.4V (typical: 3.8V)
LCM Interfaces	Two 5-inch 1280 × 720 HD resolution liquid crystal displays 4-lane MIPI DSI interface for each LCD module
Touch Panel Interfaces	Two 5-point capacitive touch panels
Camera Interfaces	Support three cameras: Rear camera supports 16M pixels with 4-lane CSI interface Front camera supports 8M pixels with 2-lane CSI interface Depth camera supports 2M pixels with 1-lane CSI interface
USB Interface	USB type-C interface Compliant with USB 3.0 and 2.0 specifications, with transmission rates up to 5Gbps on USB 3.0 and 480Mbps on USB 2.0. Support USB OTG Used for AT command communication, data transmission, software debugging and firmware upgrade
Audio Interfaces	**Analog Input:** 3 groups of analog microphone inputs, integrating internal bias voltage. One for headset, one for ECM-type microphone and one for MEMS-type microphone. **Analog Output:** 3 groups of analog audio outputs, including: One stereo headset output One mono earphone differential output

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	One mono loudspeaker differential amplifier output
(U)SIM Interfaces	Support USIM/SIM cards: 1.8V and 2.95V Support dual SIM dual standby Support hot-plug detection
UART Interfaces	Two UART interfaces: Main UART for data transmission and AT command communication Debug UART for debugging
SD Card Interface	Support 4-bit SD card with hot-plug detection
Flashlights	Support 2 flashlight LEDs for testing the module's flashlight interfaces
Sensors	Support three sensors including ALS/PS, accelerometer/gyroscope and compass
Vibrator	A vibrator for testing the motor drive interface of the module
Switches and Buttons	3 switches including two power supply switches and one emergency download switch which is used to force the module to enter into download mode; 4 buttons including PWRKEY, RESET, VOL_UP and VOL_DOWN;
Status Indication LEDs	3 LEDs are available for signal indication
Physical Characteristics	Size: 26.5cm × 18.5cm

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2.2. Interface Overviews

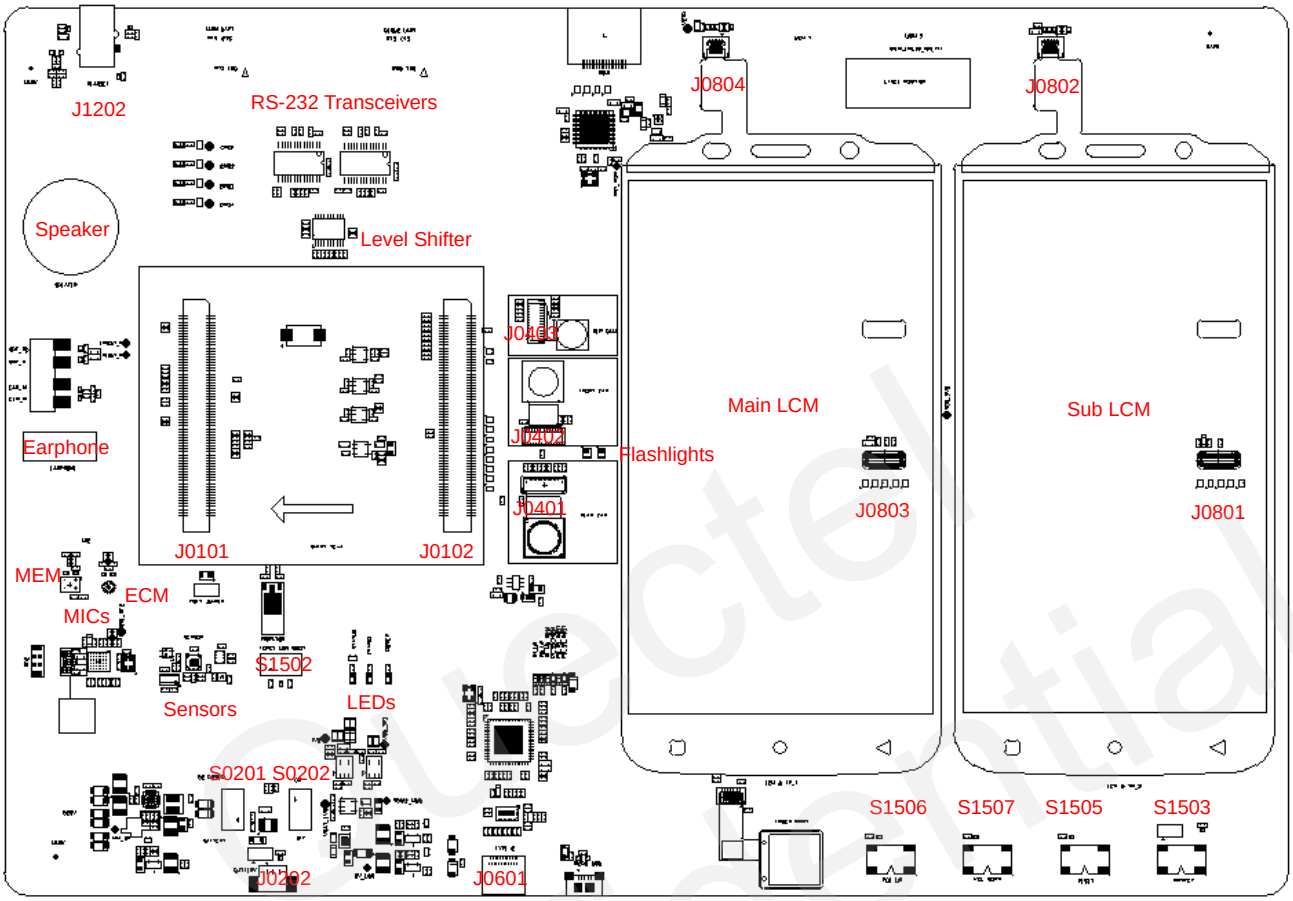

Figure 1: Smart EVB G2 Interface Overview (Top)

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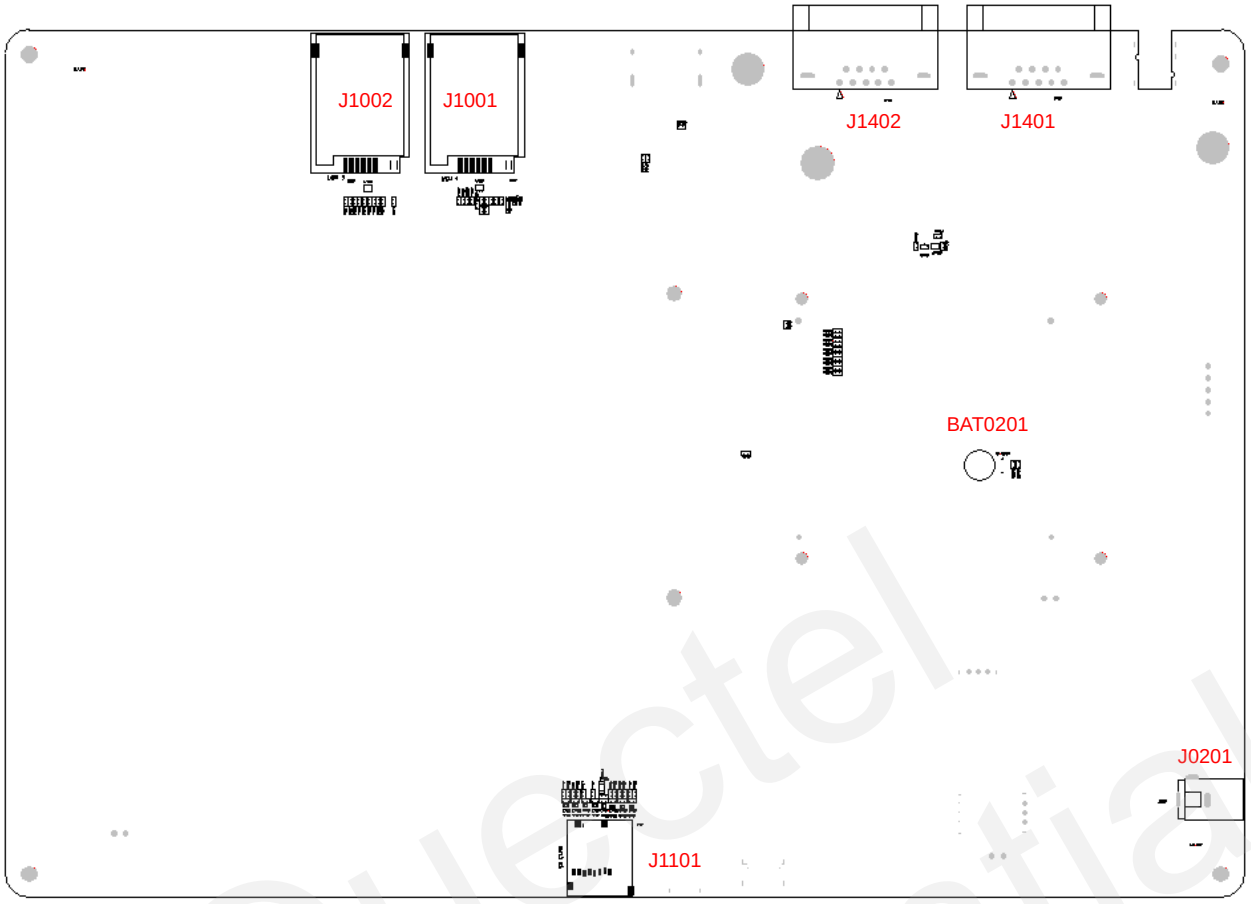

Figure 2: Smart EVB G2 Interface Overview (Bottom)

Table 2: Interfaces of Smart EVB G2

Interface	Reference Number	Description
VBAT	J0201 (bottom side)	The power jack on the EVB. Typical power supply: +5.0V
	J0202	Li-polymer battery connector
Power Supply Switches	S0201	Switch used to select DC power supply or battery power supply
	S0202	Switch used to power on/off the module
PWRKEY	S1503	Power key (push button) Used to turn on/off the module
RESET	S1505	Reset button (push button) Used to reset the module
USB_BOOT	S1502	Emergency download switch

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VOL_UP	S1506	Used to turn the volume up
VOL_DOWN	S1507	Used to turn the volume down
USB	J0601	USB type-C connector USB_VBUS power supply voltage: +5.0V
Audio	Speaker	Used for loudspeaker Rated resistance: 8Ω Rated power: 1.5W
	Earphone	Used for earphone Rated resistance: 32Ω Rated power: 30mW
	MIC (MEMS)	Used for MEMS-type microphone
	MIC (ECM)	Used for ECM-type microphone
	J1202	Audio Jack for headset
(U)SIM	J1001	Main (U)SIM card connector
	J1002	Sub (U)SIM card connector
UART	J1401	Main UART port
	J1402	Debug UART port
SD	J1101	SD card connector
LEDs	D1501 D1512 D1513*	D1501 indicates the power supply of the module D1512 indicates the charge status of the module D1513* indicates the operation status of the module
TE-A	J0101, J0102	Connectors for connecting Smart TE-A and Smart EVB G2
Cameras	J0401	Rear camera connector, support 16M CMOS sensor
	J0402	Front camera connector, support 8M CMOS sensor
	J0403	Depth camera connector, support 2M CMOS sensor
Flashlights	D0301	Flashlight LED1 for testing module's flashlight interfaces
	D0302	Flashlight LED2 for testing module's flashlight interfaces
LCM and TP	J0803	Connector for main LCM
	J0804	ZIF connector for main touch panel
	J0801	Connector for secondary LCM

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	J0802	ZIF connector for secondary touch panel
Sensors	U0301	Accelerometer and gyroscope sensor
	U0302	Compass sensor
	U0304	Ambient light sensor and proximity sensor
Coin Cell	BAT0201	Coin cell battery for RTC power supply

NOTES

1. Functions of buttons PWRKEY, VOL_UP and VOL_DOWN are supported by SG30, SG36 and SC60 modules. And the function of button RESET is supported by SG30 and SG36 modules. For details, please refer to the related reference designs and hardware designs of these Smart modules.
2. "*" means under development.

2.3. Top and Bottom Views of Smart EVB G2

Figure 3: Smart EVB G2 Top View

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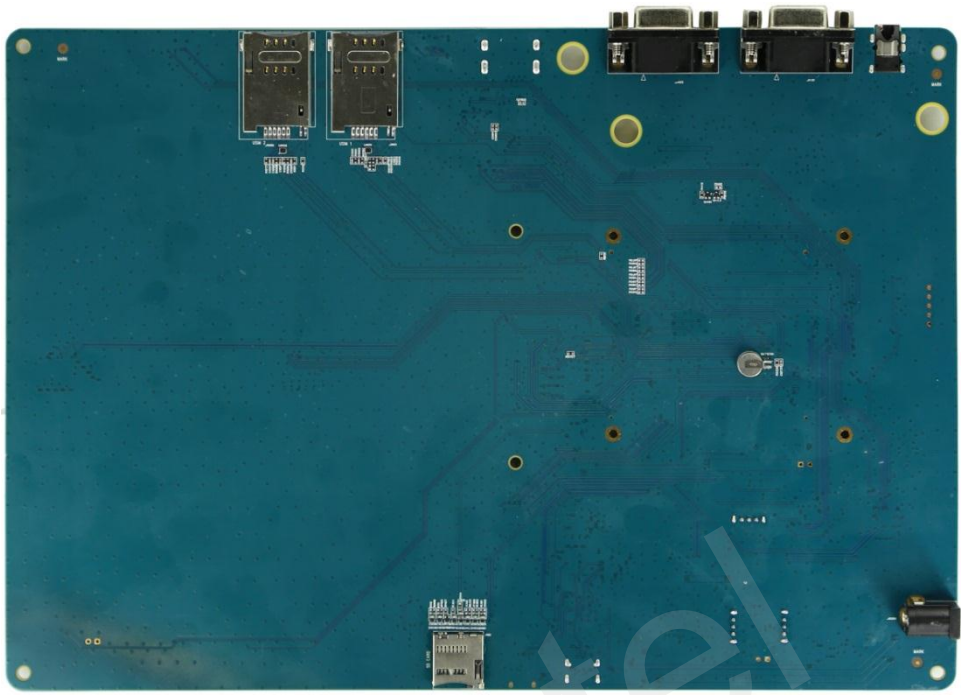

Figure 4: Smart EVB G2 Bottom View

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2.4. Smart EVB G2 Kit Accessories

All accessories of the Smart EVB G2 kit are listed as below. Please contact the supplier if there is something missing.

Figure 5: Smart EVB G2 Kit Accessories

Table 3: Accessories List

Items	Description	Quantity
Cables	USB to RS232 converter cable	1
	USB Type-C cable	1
	RF cables	4
Antennas	Main antennas	2
	Wi-Fi/BT antenna	1

	GNSS antenna (passive)	1
Audio	Earphone	1
Disk	USB 2.0 to RS232 driver and USB driver disk	1
Battery	Li-polymer battery	1
Other	Bolts and nuts for fixing Smart EVB G2	1

NOTE

The main antenna can also be used for diversity reception.

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3 Smart EVB G2 Kit Accessories Assembly

Figure 6: Smart EVB G2 Kit Accessories Assembly

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4 Interface Applications

This chapter describes the hardware interfaces of Smart EVB G2, shown as follows:

- Power supply interfaces
- Smart TE-A interface
- LCM interfaces
- Touch panel interfaces
- Camera interfaces
- USB interface
- Audio interfaces
- (U)SIM interfaces
- UART interfaces
- SD card interface
- Emergency download interface

It also provides information about flashlights, sensors, vibrator, buttons, status indication LEDs and test points to help customers use the Smart EVB G2.

4.1. Power Supply Interfaces (J0201/J0202)

The Smart EVB G2 can be powered by an external 5V DC power adapter. Connect the DC power adapter to the power jack (J0201) and then the step-down converter (DC-to-DC converter), which is used to regulate the 5V DC power supply voltage to 4.2V for operating the module. The rated power of the DC-to-DC converter is 3A.

The Smart EVB G2 can also be powered by a Li-polymer battery through the battery connector J0202 on the board.

The following figure shows the simplified power supply schematic of Smart EVB G2.

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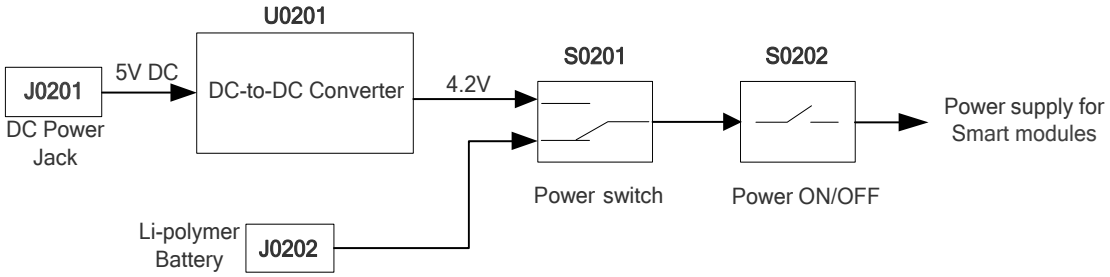

Figure 7: Simplified Power Supply Schematic of Smart EVB G2

NOTES

1. Smart modules can be powered on only when the Li-polymer battery is present, so a Li-polymer battery should be provided for them even when Smart EVB G2 is powered by a DC adapter. Otherwise modification is required. For more details, please refer to ***Chapter 4.1.3***.
2. If customers want to use USB 3.0 or OTG function, DC adapter must be used to supply 5V power for super-speed switch IC.

4.1.1. Adapter Interface

The following figure shows the DC power jack of the Smart EVB G2.

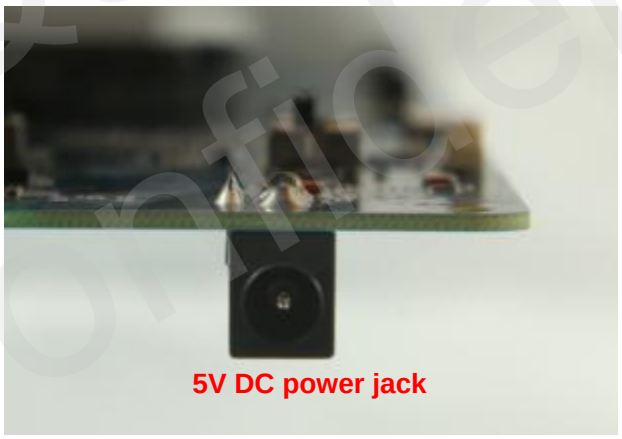

Figure 8: 5V DC Power Jack

Before connecting the power supply, customers have to select a proper +5V DC power adapter to supply power for the Smart EVB G2, and the power plug design of the adapter is shown as below.

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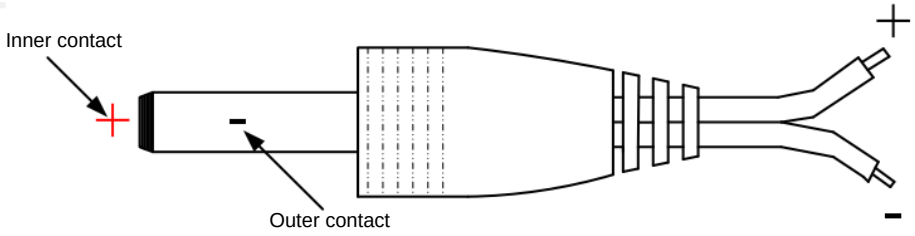

Figure 9: Power Plug Design

4.1.2. Battery Interface

The following figure shows a reference circuit design for battery interface.

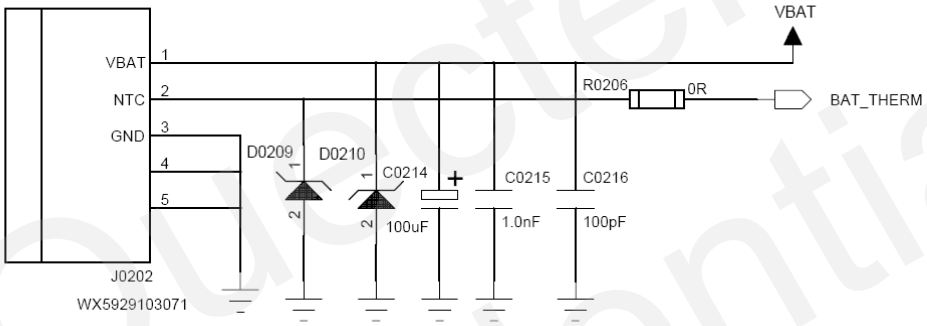

Figure 10: Reference Circuit Design for Battery Interface

The following figure shows the pin assignments of battery interface, and the following table shows the pin definition of battery interface.

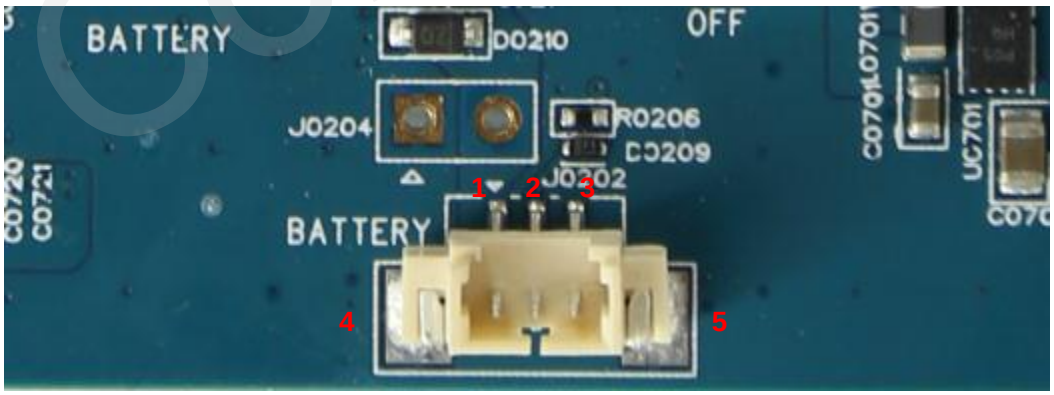

Figure 11: Pin Assignments of Battery Interface

Table 4: Pin Definition of Battery Interface

Pin No.	Pin Name	Description	Comment
1	VBAT	Power input pin. Connect to the positive pole of the battery.	
2	NTC	Used for battery temperature detection. A 47K thermistor can be used for the battery protection circuit.	
3, 4, 5	GND	Ground pins. Pin 3 is connected to the negative pole of the battery.	

Figure 12: Battery Assembly

4.1.3. Modification for Powering on Module with DC Adapter Only

Smart modules can be powered on directly through VBAT when the battery is present. But when the battery is not available, and the module can only be powered by DC adapter, the module will boot first and then detect if there is a battery by detecting whether there is a thermistor between ground and BAT_THERM pin with the battery pack thermal monitor. If no battery is detected, the module will assume that there is no available power supply and shut down automatically. So if customers want to power on the module only with DC adapter when battery is not available, the following modification should be made: keep battery not assembled, remove the TVS on D0209 and mount a 47K resistor of 0402 package size on D0209.

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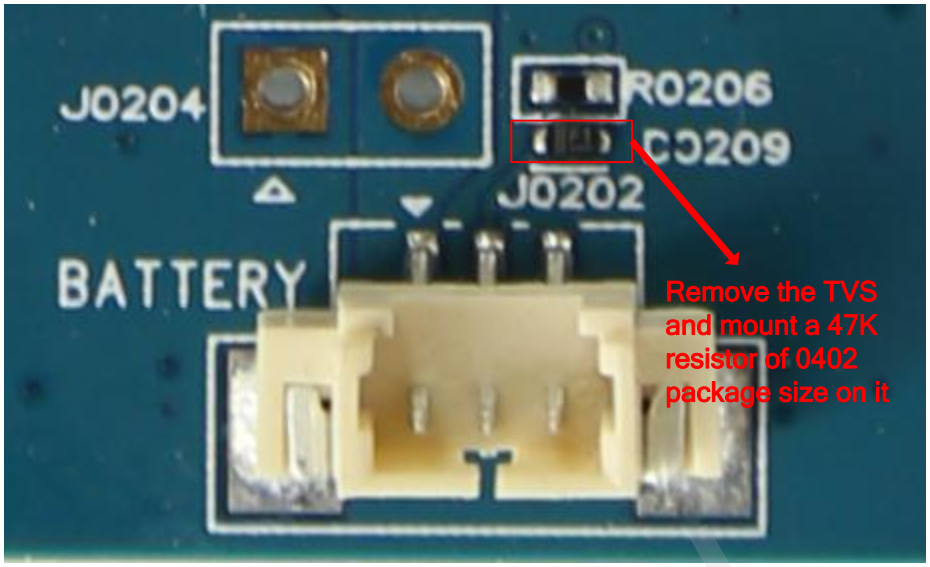

Figure 13: Modification for Powering on Module with DC Adapter Only

4.1.4. Switches for Power Supply

The switches for power supply are shown in following figure. S0201 is used to switch between DC power supply and battery power supply. S0202 is the switch used to power on/off the module.

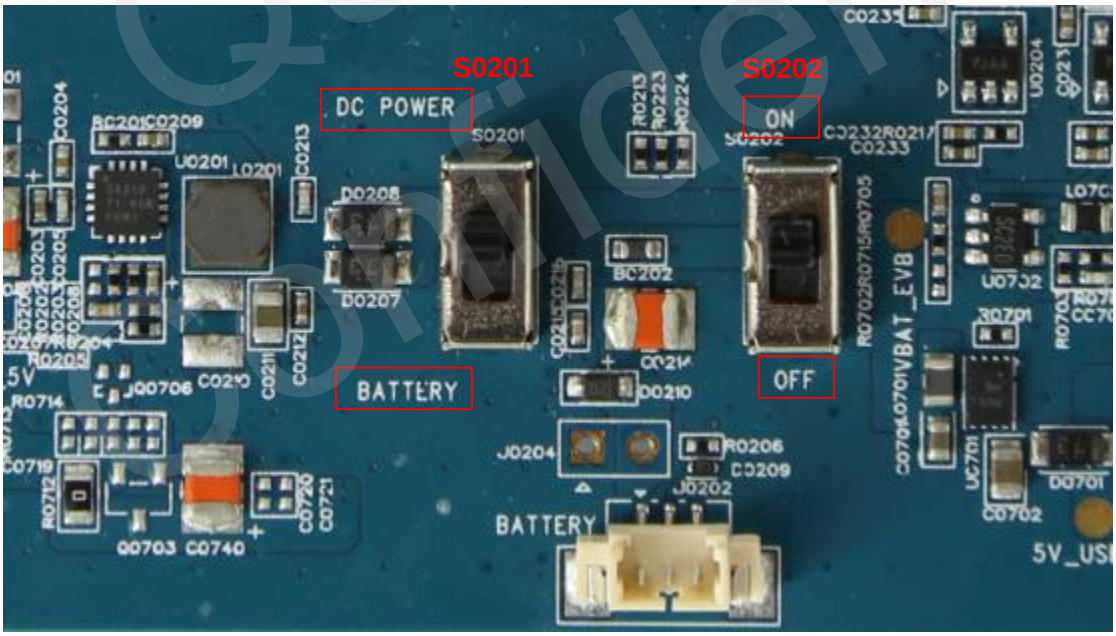

Figure 14: Power Supply Switches

Table 5: Description of Power Supply Switches

Switch No.	Description
S0201	Switch used to select DC power supply or battery power supply
S0202	Switch used to power on/off the module

4.2. Smart TE-A Interface

The Smart TE-A interface supports SG30, SG36 and SC60 modules, and includes two BTB connectors named J0101 and J0102, respectively. Smart TE-A is connected to the EVB via the two connectors. With Smart modules, customers can easily design wireless communication products.

The following two figures show the two B2B connectors and the sketch map of the Smart TE-A.

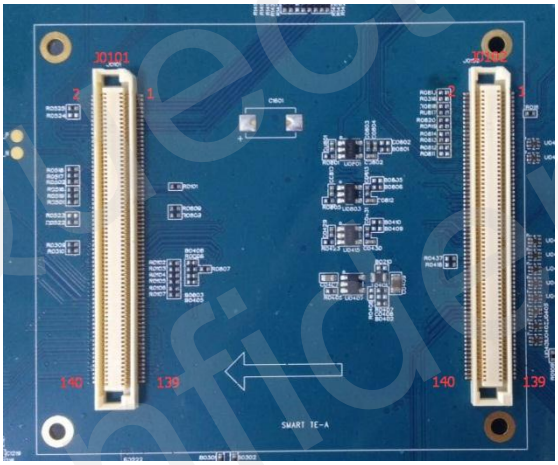

Figure 15: B2B Connectors

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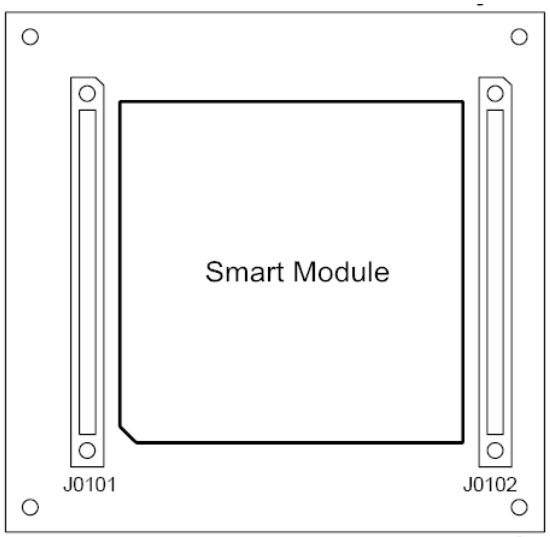

Figure 16: Sketch Map of Smart TE-A

The following table describes the pin definition of the two B2B connectors J0101 and J0102.

Table 6: Pin Definition of B2B Connectors

Pin No. of J0101	Pin Name of J0101	Pin No. of J0102	Pin Name of J0102
1, 11, 37, 71, 83, 90, 94, 101, 103, 104, 109~111, 116, 122, 127~129, 134, 139, 140	GND	1	USIM1_VDD
2	LCD_RST1	2, 8, 14, 20, 21, 23, 26, 29, 32, 35, 41, 47, 53, 59, 65, 73, 79, 85, 90, 91, 94, 97, 98, 102, 103, 109, 114, 115, 120, 121, 126, 132, 139	GND
3	UART1_CTS	3	USIM1_DET
4	INT_MIPI_HDMI	4	DSI1_LN3_P
5	UART1_RXD	5	USIM1_RST
6	RST_MIPI_HDMI	6	DSI1_LN3_N
7	UART1_RTS	7	USIM1_CLK
8	DOWNLOAD_NFC	9	USIM1_DATA

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9	UART1_TXD	10	DSI1_LN2_N
10, 21~35, 39~46, 47, 48, 51, 53, 55, 57, 62~67, 86, 88, 97, 118,130	NC	11	USIM2_VDD
12, 14	VDD_3V3	12	DSI1_LN2_P
13	UART2_CTS	13	USIM2_DET
15	UART2_RXD	15	USIM2_RST
16	GPIO1	16	DSI1_LN1_N
17	UART2_RTS	17	USIM2_CLK
18	GPIO2	18	DSI1_LN1_P
19	UART2_TXD	19	USIM2_DATA
20	GPIO3	22	DSI1_LN0_N
22	GPIO4	24	DSI1_LN0_P
36	TP1	25	CSI2_LN0_P
38	TP2	27	CSI2_LN0_N
45	SD_LDO12	28	DSI1_CLK_N
49	LDO2_1V1	30	DSI1_CLK_P
50	LCD_TE1	31	CSI2_CLK_P
52	LCD_TE1	33	CSI2_CLK_N
54	NFC_I2C_SDA	34	TP_RST
56	NFC_I2C_SCL	36	TP_INT
58	EN_5V_SW	37	DSI0_LN3_P
59	PMU_MPP2	38	TP_I2C_SCL
60	GREEN_LED	39	DSI0_LN3_N
61	DSI_PWM	40	TP_I2C_SDA
68	ENABLE_NFC	42	LCD_TE

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69	FORCE_USB_BOOT	43	DSI0_LN2_P
70	IQR_NFC	44	LCD_RST
72	CAM_1V2_EN	45	DSI0_LN2_N
73	HAP_P	46	GPIO_16
74	SENSOR_I2C_SCL	48, 64, 66, 134, 140	NC
75	HAP_N	49	DSI0_LN1_P
76	SENSOR_I2C_SDA	50	CTP_EN
77	LCD_BL_A	51	DSI0_LN1_N
78	GYROSCOPIC_INT	52	SPI_CLK
79	LCD_BL_K1	54	SPI_MISO
80	FSYNC	55	DSI0_LN0_P
81	LCD_BL_K2	56	SPI_MOSI
82	ALPS_INT	57	DSI0_LN0_N
84	IN_PRESSURE	58	SPI_CS
85	LDO23_1V2	60	RST_FP
87	LDO5_1V8	61	DSI0_CLK_P
89	LDO6_1V8	62	INT_FP
91	LDO10_2V8	63	DSI0_CLK_N
92	FM_ANT	67	PWRKEY
93	LDO22_2V8	68	EN_AVDD_CAM
95	LDO17_2V85	69	RESET_N
96	HPH_R	70	DCAM_I2C_SDA
98	HPH_REF	71	PMI_MPP1
99	VRTC	72	DCAM_I2C_SCL
100	HPH_L	74	DCAM_PWDN

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102	HS_DET	75	CSI1_LN1_P
105, 107	USB_VBUS	76	DCAM_RST
106	SPK_P	77	CSI1_LN1_N
108	SPK_N	78	SCAM_PWDN
112	EAR_P	80	SCAM_RST
113, 115, 117, 119, 121, 123, 125	VBAT	81	CSI1_LN0_P
114	EAR_N	82	CAM_I2C_SDA
120	MIC_BIAS1	83	CSI1_LN0_N
124	MIC_GND	84	CAM_I2C_SCL
126	MIC3_P	86	MCAM_PWDN
131	BATT_MINUS	87	CSI1_CLK_P
132	MIC2_P	88	MCAM_RST
133	BATT_PLUS	89	CSI1_CLK_N
135	VBAT_SNS	92	DCAM_MCLK
136	MIC1_N	93	CSI0_LN3_P
137	BAT_THERM	95	CSI0_LN3_N
138	MIC1_P	96	SCAM_MCLK
		99	CSI0_LN2_P
		100	MCAM_MCLK
		101	CSI0_LN2_N
		104	FLASH_LED1
		105	CSI0_LN1_P
		106	FLASH_LED2
		107	CSI0_LN1_N
		108	USB_ID

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	110	NRST_HUB
	111	CSI0_LN0_P
	112	USB_OTG_PWR_EN
	113	CSI0_LN0_N
	116	USB_HS_DM
	117	CSI0_CLK_P
	118	USB_HS_DP
	119	CSI0_CLK_N
	122	USB_SS_TX_M
	123	SD_LDO11
	124	USB_SS_TX_P
	125	SD_CMD
	127	SD_DET
	128	USB_SS_RX_M
	129	SD_CLK
	130	USB_SS_RX_P
	131	SD_DATA0
	133	SD_DATA1
	135	SD_DATA2
	136	KEY_VOL_DOWN
	137	SD_DATA3
	138	KEY_VOL_UP

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4.3. LCM Interfaces

4.3.1. Main LCM Interface

The Smart EVB G2 provides two LCM interfaces and can be equipped with two LCD modules for dual display function. Currently the Smart EVB G2 provides two 5-inch 1280 × 720 HD resolution liquid crystal displays for customers to test.

The following figure shows a reference circuit design for main LCM interface of the Smart EVB G2.

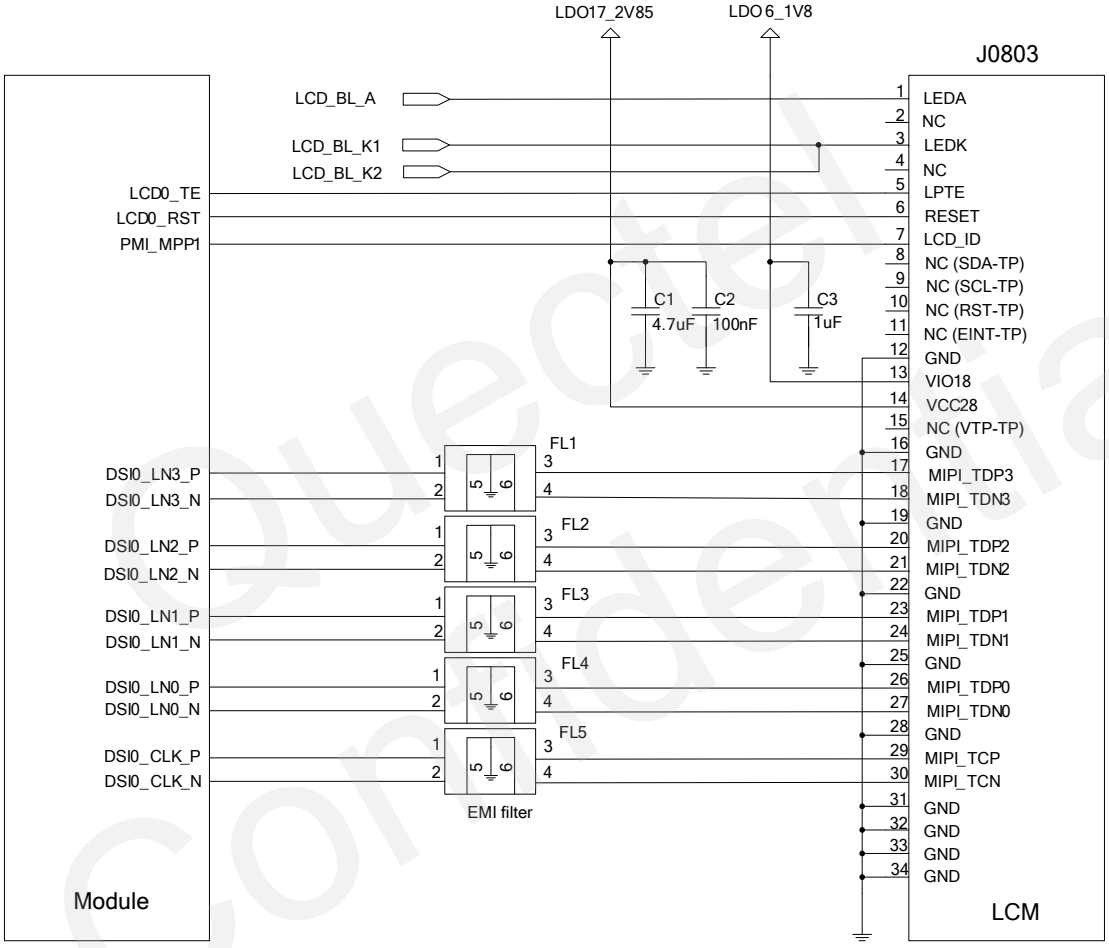

Figure 17: Reference Circuit Design for Main LCM Interface

NOTE

The white LEDs (WLED) of main LCM interface are driven by the module. LCD_BL_A is the high voltage source for powering a string of WLEDs. LCD_BL_K1 and LCD_BL_K2 are the two output drivers for sinking the current from WLED strings.

4.3.2. Secondary LCM Interface

The following figure shows a reference circuit design for secondary LCM interface of the Smart EVB G2.

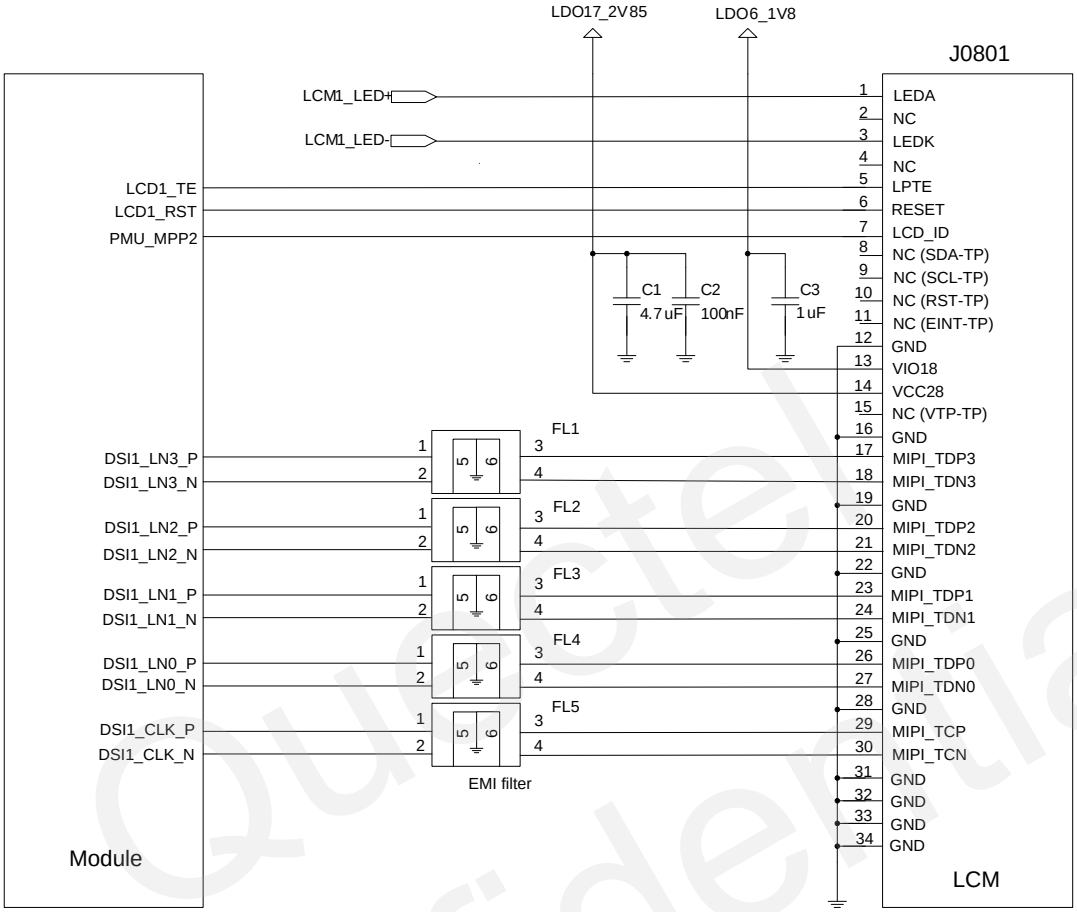

Figure 18: Reference Circuit Design for Secondary LCM Interface

4.3.3. Backlight Driver for Secondary LCM Interface

The Smart EVB G2 uses a PWM dimming step-up LED driver for the WLED backlighting of secondary LCM interface.

The following figure shows a reference circuit design for the backlight driver.

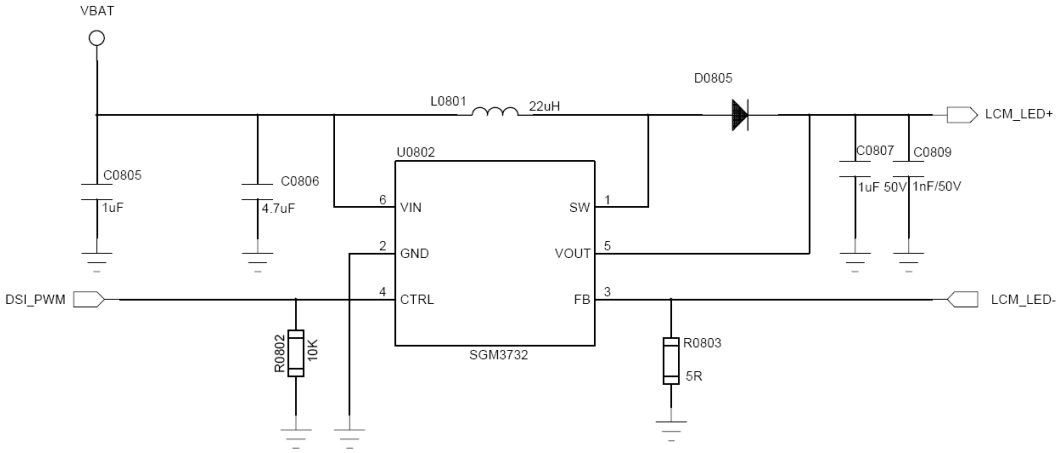

Figure 19: Reference Circuit Design for Backlight Driver

4.4. Touch Panel Interfaces

The Smart EVB G2 provides two touch panel interfaces. J0804 is the connector for the connection between touch panel of main LCM interface and Smart EVB G2, and J0802 is the connector for the connection between touch panel of secondary LCM interface and Smart EVB G2. The following figure shows a reference circuit design for touch panel interfaces.

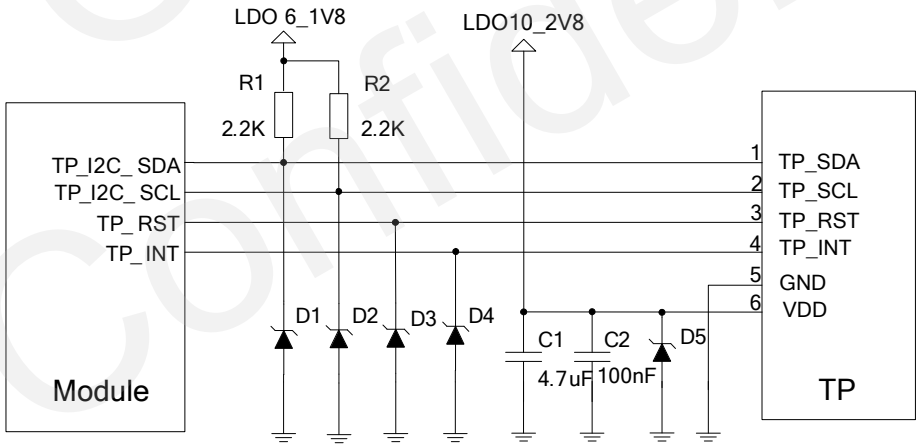

Figure 20: Reference Circuit Design for Touch Panel Interfaces

The following figure shows the pin assignments of touch panel interfaces, and the following table shows the pin definition of touch panel interfaces.

Figure 21: Pin Assignments of Touch Panel Interfaces

Table 7: Pin Definition of Touch Panel Interfaces

Pin No.	Pin Name	Description	Comment
1	TP_SDA	I2C data signal of touch panel	
2	TP_SCL	I2C clock signal of touch panel	
3	TP_RST	Reset signal of touch panel	Active low
4	TP_INT	Interrupt signal of touch panel	
5	GND	Ground	
6	VDD	2.8V power supply for touch panel VDD power	

4.5. Camera Interfaces

Smart EVB G2 provides three camera interfaces (4-lane+2-lane+1-lane) for rear camera, front camera and depth camera. Rear camera uses a 16M pixels digital CMOS sensor with auto-focusing function. Front camera uses an 8M pixels CMOS sensor with auto-focusing function and depth camera uses a 2M pixels CMOS sensor. The following figure shows a reference circuit design for camera interfaces.

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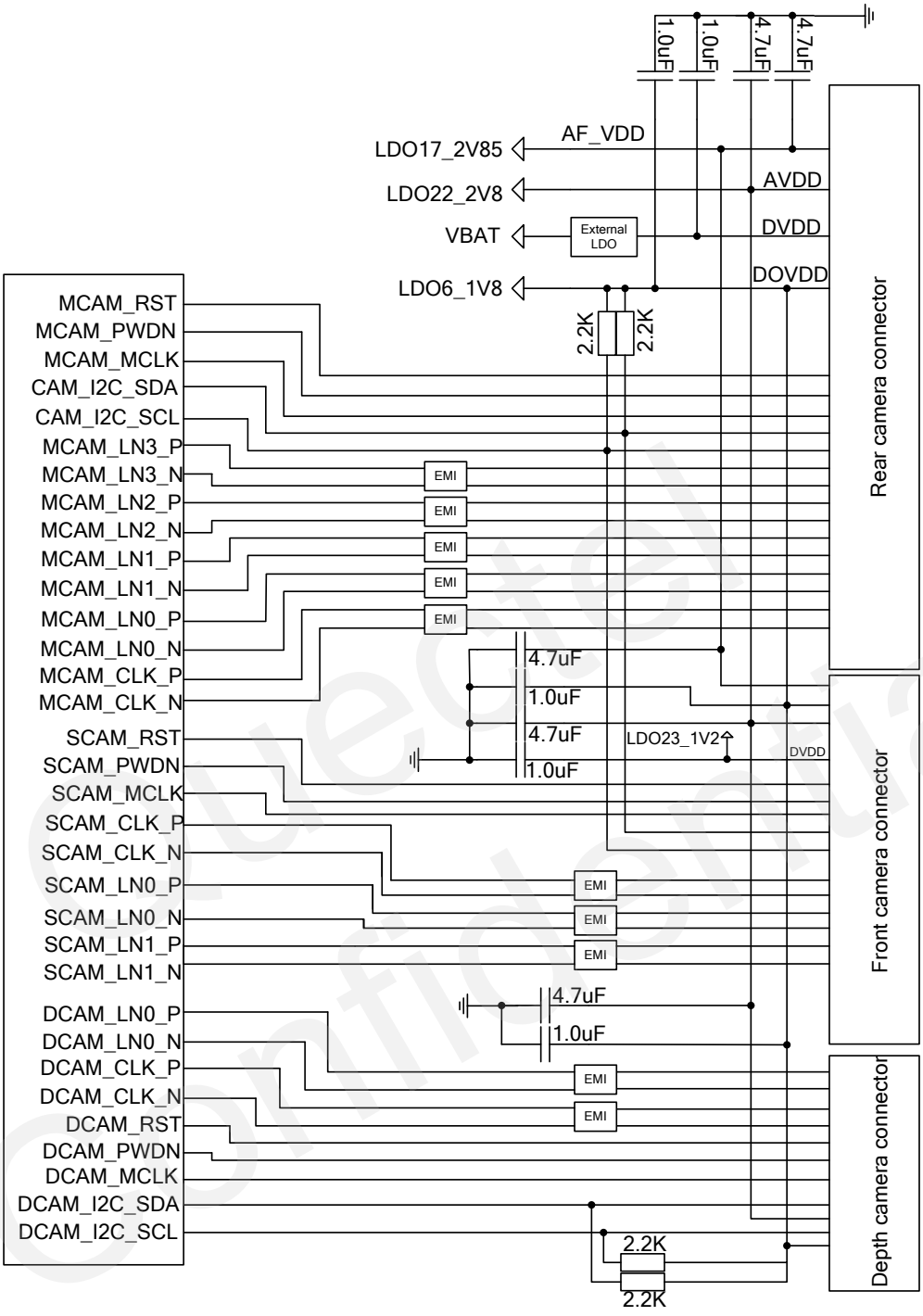

Figure 22: Reference Circuit Design for Camera Interfaces

The following figure shows the camera interfaces with cameras assembled.

Figure 23: Camera Interfaces with Cameras Assembled

4.6. USB Interface

The Smart EVB G2 provides one integrated Universal Serial Bus (USB) interface which complies with the USB 3.0/2.0 specifications and supports super speed (5Gbps) on USB 3.0, high speed (480 Mbps) on USB 2.0 and full speed (12 Mbps) modes. The USB interface supports USB OTG function, and is used for AT command communication, data transmission, software debugging and firmware upgrade.

The following figure shows a reference circuit design for USB type-C interface.

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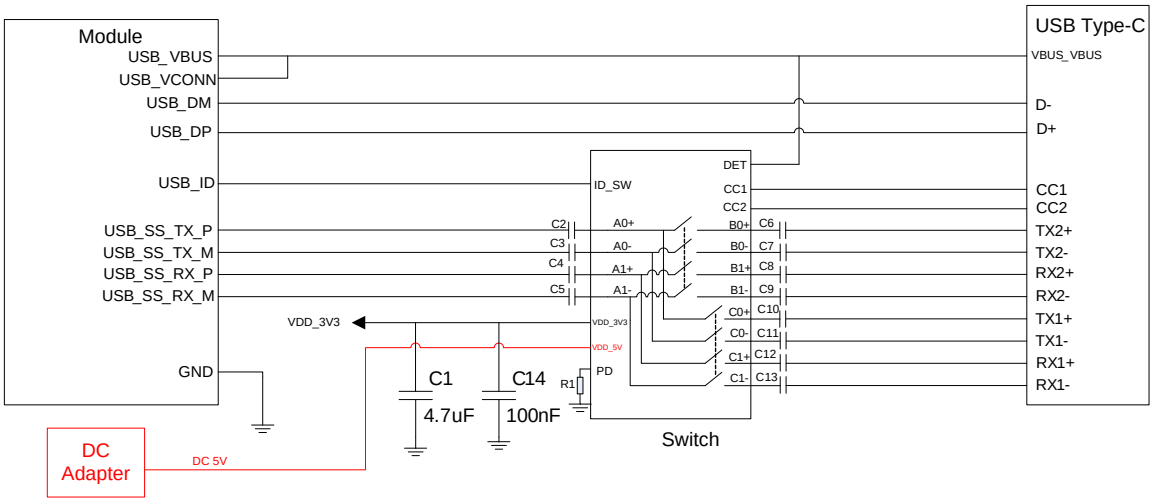

Figure 24: Reference Circuit Design for USB Type-C Interface

NOTES

1. USB super-speed switch IC is powered by DC adapter. So if customers want to use USB 3.0 interface or USB OTG function, the module serves as the host device and the DC adapter must be plugged in.
2. If customers want to use USB 2.0 interface only, the module serves as the slave device. The DC adapter can be removed and the power supply for super-speed switch IC is not needed.

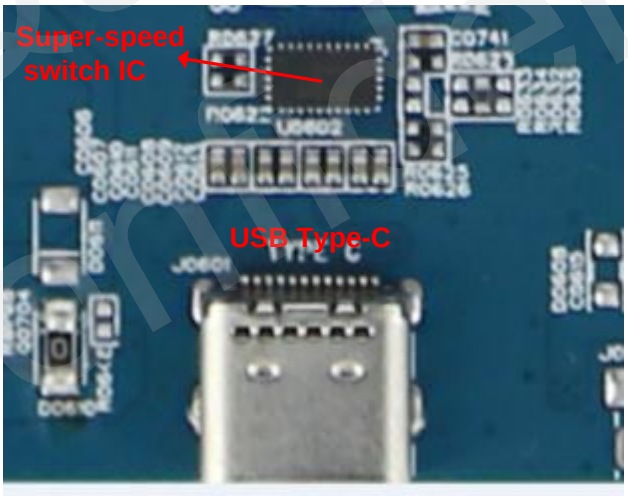

Figure 25: USB Type-C Interface

4.7. Audio Interfaces

Smart EVB G2 provides three analog audio outputs including one mono loudspeaker, one mono earphone, and one stereo headset. The Smart EVB G2 also provides three analog audio inputs including two single-ended and one differential microphone inputs. One single-ended microphone input is used for headset interface. One single-ended and one differential microphone inputs are used for microphone interfaces.

4.7.1. Loudspeaker Interface

Smart EVB G2 provides one loudspeaker interface and the loudspeaker is soldered onto the Smart EVB G2 via test points TP1201 and TP1202. The following figure shows a reference circuit design for loudspeaker interface.

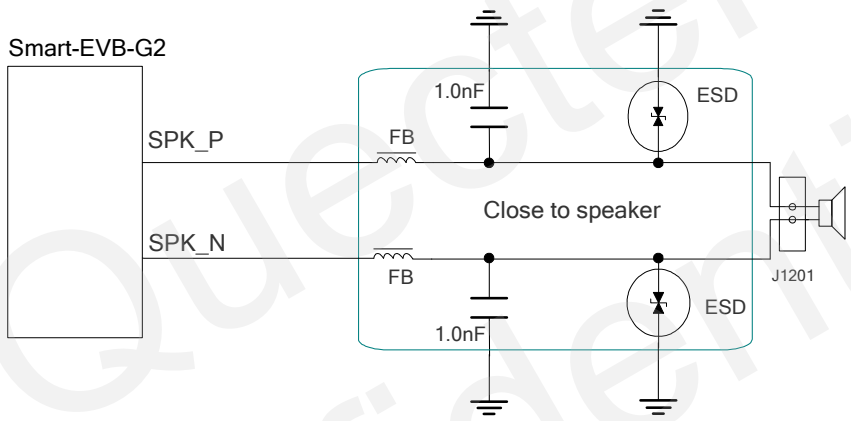

Figure 26: Reference Circuit Design for Loudspeaker Interface

4.7.2. Headset Interface

The following figure shows a reference circuit design for headset interface.

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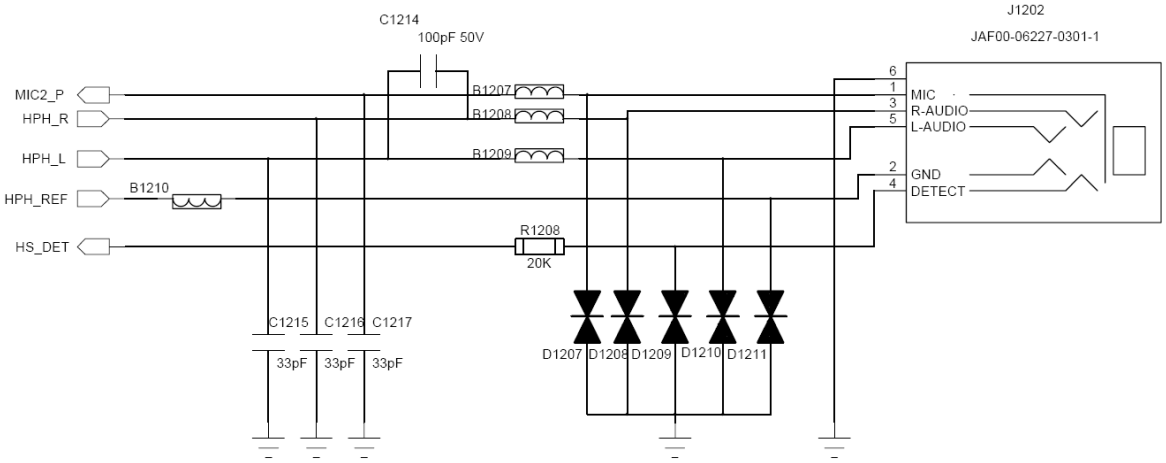

Figure 27: Reference Circuit Design for Headset Interface

The following figure shows the pin assignments of headset interface.

Figure 28: Pin Assignments of Headset Interface

The following table shows the pin definition of headset interface.

Table 8: Pin Definition of Headset Interface

Pin No.	Pin Name	Function
1	MIC	Positive microphone input
2	GND	Dedicated GND for audio
3	R-AUDIO	Earphone right channel
4	DETECT	Earphone detection
5	L-AUDIO	Earphone left channel
6	GND	Ground

The following figure shows the sketch design of audio plug which suits for the audio jack on Smart EVB G2.

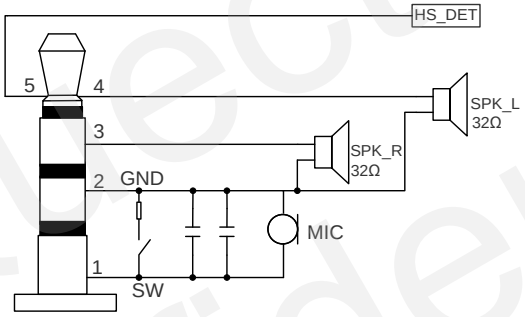

Figure 29: Sketch of Audio Plug

4.7.3. Earphone Interface

Smart EVB G2 provides one earphone interface and the earphone is soldered onto the Smart EVB G2 via test points TP1203 and TP1204. The following figure shows a reference circuit design for earphone interface.

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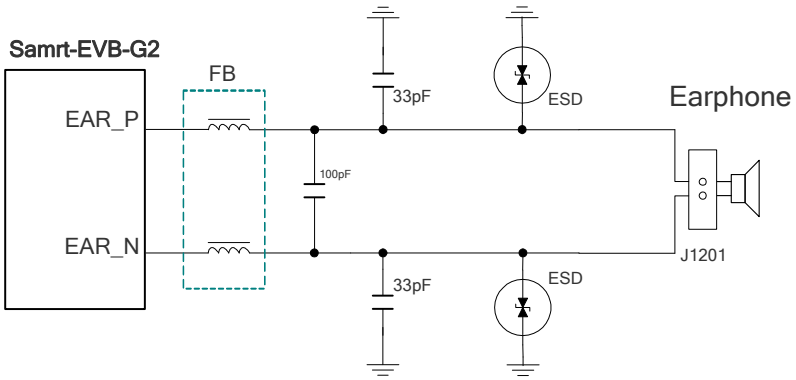

Figure 30: Reference Circuit Design for Earphone Interface

4.7.4. Microphone Interfaces

Smart EVB G2 provides one single-ended and one differential microphone inputs for microphone interfaces. The single-ended microphone input is for MEMS-Type microphone and the differential microphone input is for ECM-Type microphone. The following figures show a reference circuit design for microphone interfaces and the two microphones.

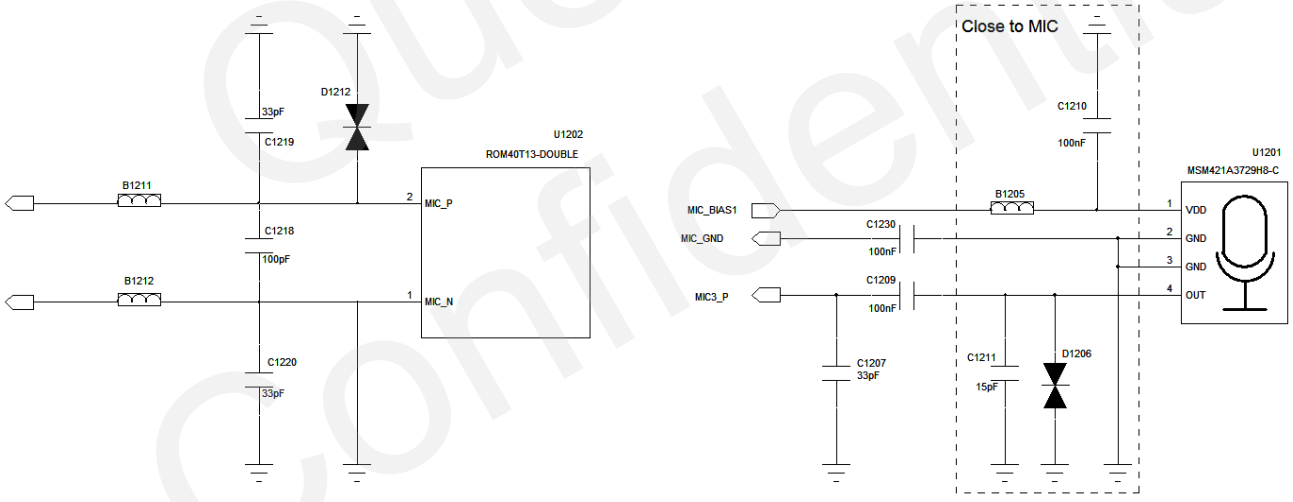

Figure 31: Reference Circuit Design for Microphone Interfaces

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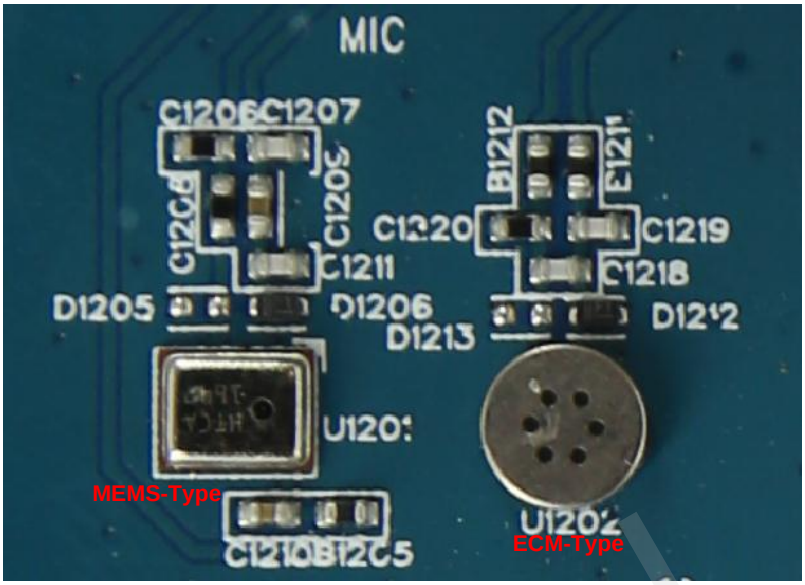

Figure 32: MEMS-Type and ECM-Type Microphones

4.8. (U)SIM Interfaces

The Smart EVB G2 provides two 6-pin push-push type (U)SIM card (3V or 1.8V) connectors J1001 (main (U)SIM card connector) and J1002 (Sub (U)SIM card connector). The following figure shows the simplified interface schematic for J1001.

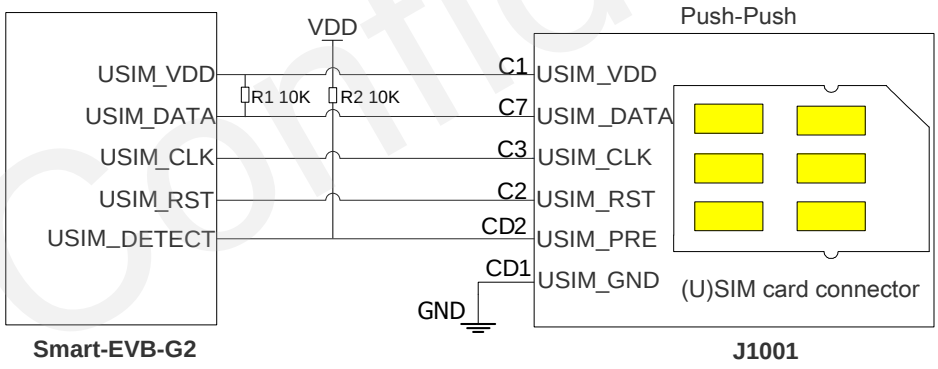

Figure 33: Simplified Interface Schematic for (U)SIM Card Connector J1001

The following figure shows the pin assignments of main (U)SIM card connector (J1001).

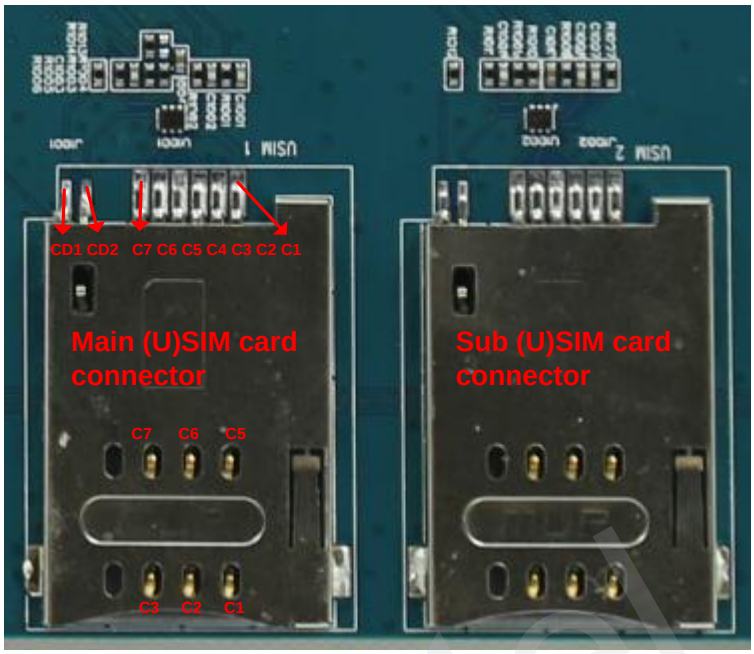

Figure 34: Pin Assignments of Main (U)SIM Card Connector

Table 9: Pin Definition of Main (U)SIM Card Connector

No.	Pin Name	I/O	Function
C1	USIM_VDD	O	(U)SIM card power supply
C2	USIM_RST	O	(U)SIM card reset signal
C3	USIM_CLK	O	(U)SIM card clock signal
C5	GND		Ground
C6	VPP		Not connected
C7	USIM_DATA	I/O	(U)SIM card clock signal; Bi-directional
CD1	USIM_GND	GND	(U)SIM card detection
CD2	USIM_PRESENCE	I	(U)SIM card detection

NOTE

The schematic and pin assignments of J1002 are the same as J1001's.

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4.9. UART Interfaces

Smart EVB G2 provides two UART interfaces: main UART port J1401 and debug UART port J1402. The main UART interface can be used for data transmission and AT command communication. And the debug UART interface is used for debugging.

The following figure shows the block diagram of UART on Smart EVB G2.

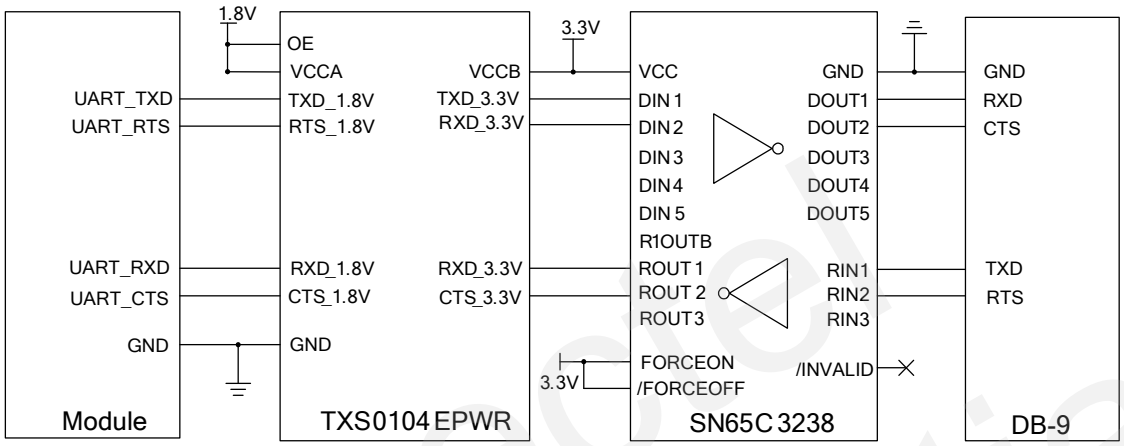

Figure 35: RS232 Level Match Circuit

The following figure shows the pin assignments of main UART port (J1401).

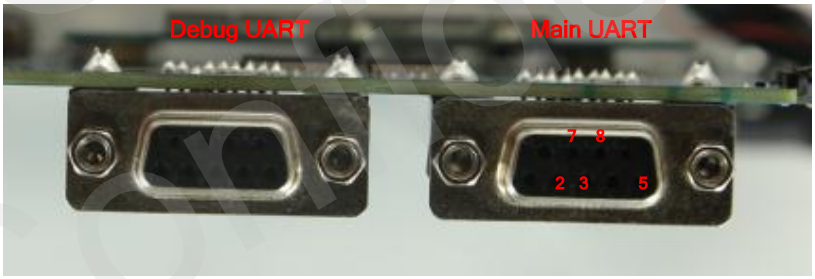

Figure 36: Pin Assignments of Main UART Port

Table 10: Pin Definition of Main UART Port

J1401	Pin Name	I/O	Description
2	RS232_TXD	O	Transmit data
3	RS232_RXD	I	Receive data

5	RS232_GND		Ground
7	RS232_CTS	I	Clear to send
8	RS232_RTS	O	Request to send

NOTE

The schematic and pin assignments of J1402 are the same as J1401's.

4.10. SD Card Interface

Smart EVB G2 provides an SD card interface J1101 for customers to test the module's SD card interface. The following figure shows the simplified interface schematic for SD card interface on Smart EVB G2.

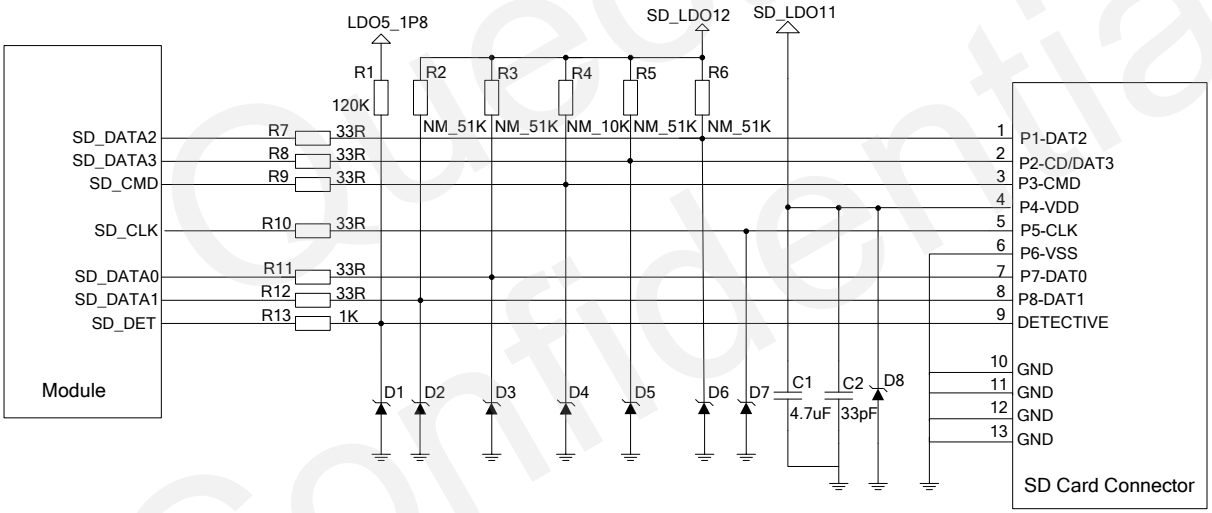

Figure 37: Simplified Interface Schematic for SD Card Interface

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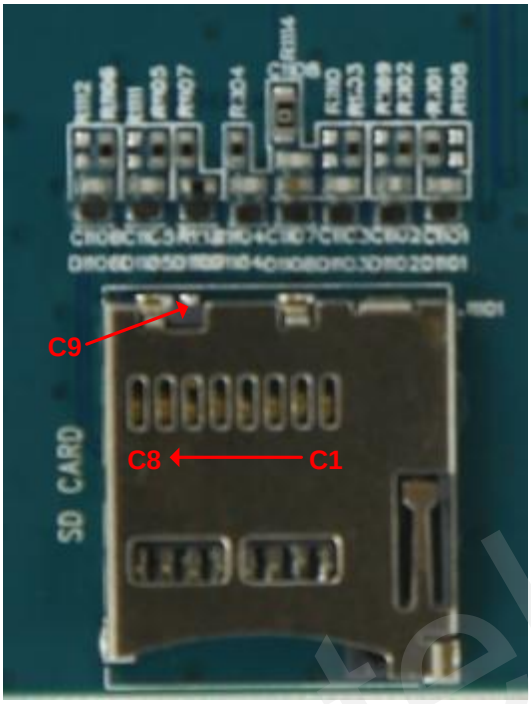

Figure 38: Pin Assignments of SD Card Interface

4.11. Flashlights

Smart EVB G2 provides two flashlight LEDs D0301 and D0302 for testing the module's flashlight interfaces which support flash mode and torch mode. The following figures show a reference circuit design for flashlights and their locations on Smart EVB G2.

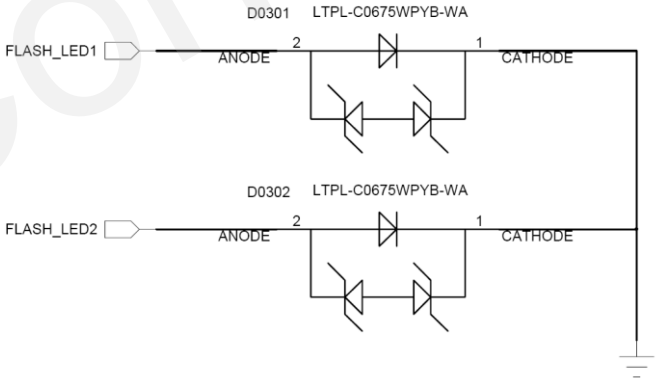

Figure 39: Reference Circuit Design for Flashlight Interfaces

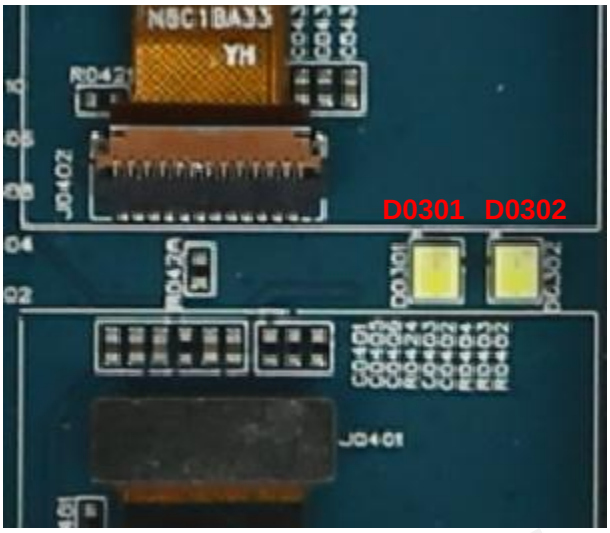

Figure 40: Flashlights

4.12. Sensors

Smart EVB G2 provides three sensors for debugging which are shown in following figure.

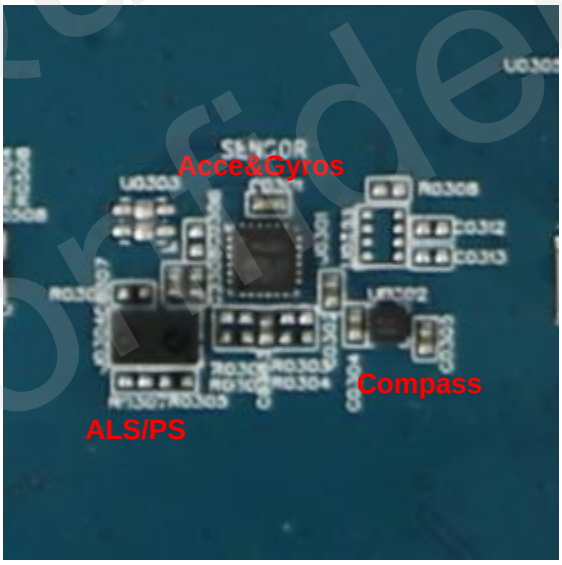

Figure 41: Sensors

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4.13. Emergency Download Interface

Smart EVB G2 provides one emergency download switch USB_BOOT to force the module enter into download mode. Pull up USB_BOOT pin to 1.8V before powering on the module when the function is used. The following figures show a reference circuit design for the emergency download interface and its switch.

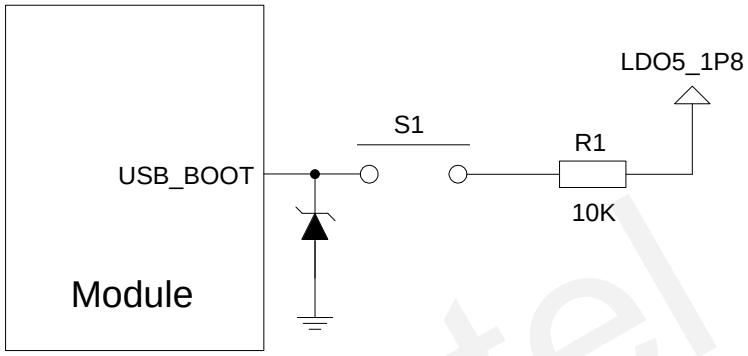

Figure 42: Reference Circuit Design for Emergency Download Interface

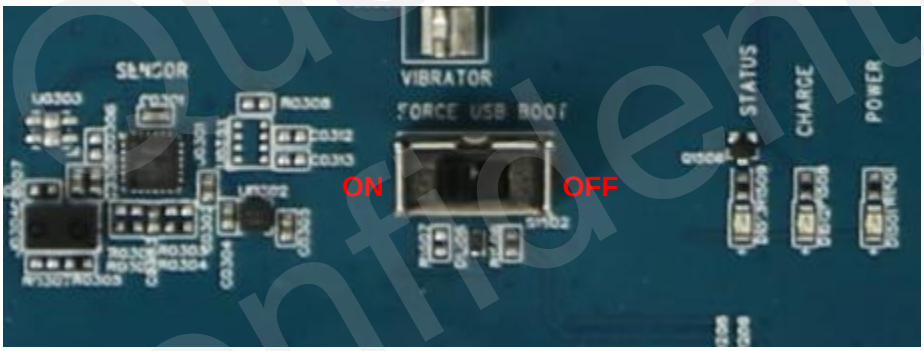

Figure 43: Emergency Download Switch

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4.14. Vibrator

Smart EVB G2 provides an ERM-type vibrator for customers to test the motor driver interface of Smart modules. The following figures show a reference circuit design and the vibrator on the board.

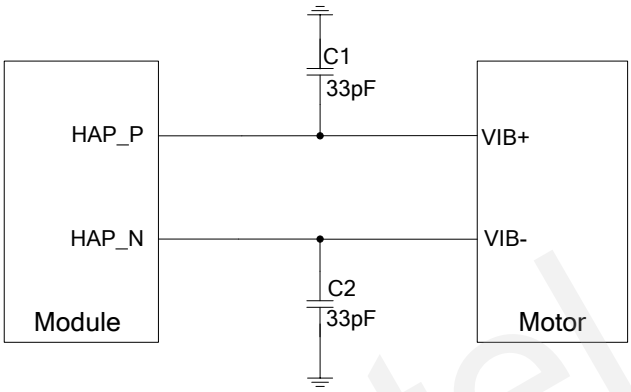

Figure 44: Reference Circuit Design for Vibrator

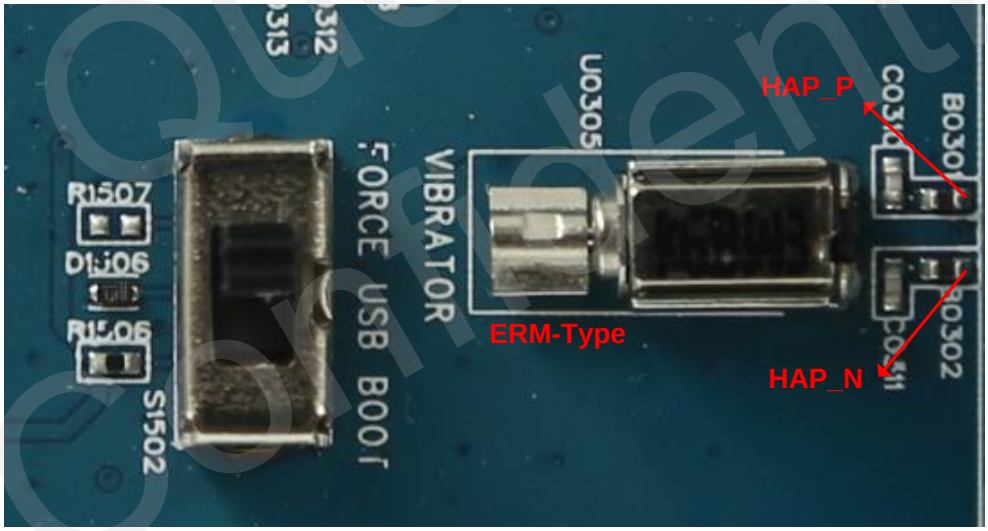

Figure 45: ERM-Type Vibrator

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4.15. Buttons

Smart EVB G2 provides four buttons (S1503, S1505, S1506 and S1507) including PWRKEY, RESET, VOL_UP and VOL_DOWN, which are shown in following figure

Figure 46: Buttons

Table 11: Description of Buttons

Items	Description
S1503	Power key (push button) Used to turn on/off the module
S1505	Reset button (push button) Used to reset the module
S1506	Used to turn the volume up
S1507	Used to turn the volume down

NOTE

Functions of buttons PWRKEY, VOL_UP and VOL_DOWN are supported by SG30, SG36 and SC60 modules. And the function of button RESET is supported by SG30 and SG36 modules. For details, please refer to the related reference designs and hardware designs of these Smart modules.

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4.16. Status Indication LEDs

There are several status indication lights (D1501, D1512 and D1513*) for signal indication on Smart EVB G2, shown as below.

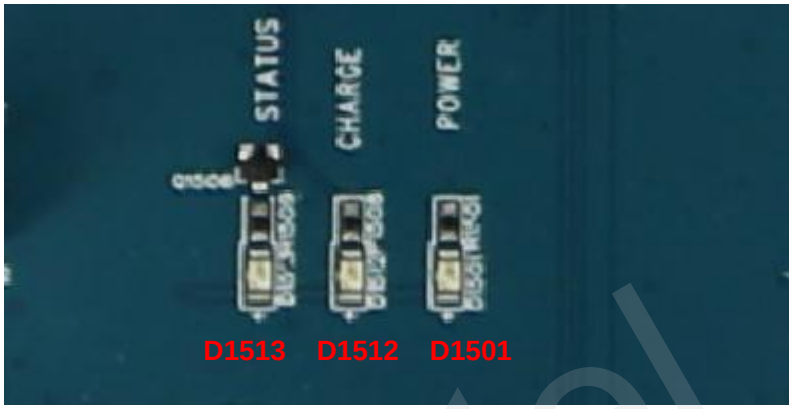

Figure 47: Status Indication LEDs

Table 12: Description of Status Indication LEDs

Items	Description
D1501	Indicate the power supply status of Smart modules Bright: VBAT ON Extinct: VBAT OFF
D1512	Indicate the charge status of Smart modules Bright: module is charging Extinct: module charge is stopped
D1513*	Indicate the operation status of Smart modules

NOTE

"*" means under development.

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5 Operation Procedures Illustration

This chapter introduces how to use the Smart EVB G2 for testing and evaluation of Quectel Smart modules.

5.1. Power ON Smart Modules

The following are the procedures for powering on the smart modules.

1. Connect the Smart TE-A to the connectors (J0101 and J0102) on Smart EVB G2.
2. If battery power supply mode is selected, install a Li-polymer battery on J0202 and then switch S0201 to **BATTERY** state. If 5V DC power supply mode is selected and the battery is present, switch S0201 to **DC_POWER** state.
3. Switch S0202 to **ON** state, after which D1501 will be lighted.
4. Press S1503 (**PWRKEY**) for at least 2s to boot the module. When the following interface is displayed on the utilized LCD(s), it means the booting has been completed.

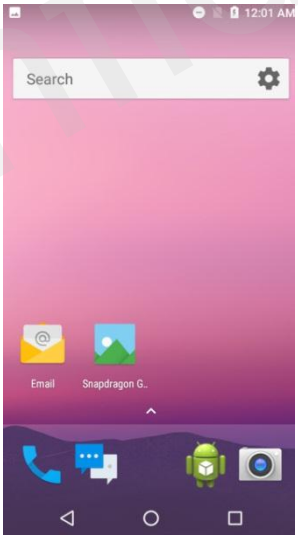

Figure 48: LCD Display Indicating Module's Power-on

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NOTES

1. For the details of powering on Smart module with DC adapter only, please refer to ***Chapter 4.1.3***.
2. Inserting USB into USB interface after power supply is provided can also power on the module.

5.2. Communication Via USB or UART Interface

5.2.1. Communication via USB Interface

1. Power on the module according to the procedures mentioned in ***Chapter 5.1***.

2. Connect Smart EVB G2 and the PC with USB Type-C cable through USB Type-C interface and then run the driver disk on PC to install the USB driver. The USB port numbers can be viewed through the PC's Device Manager, shown as below.

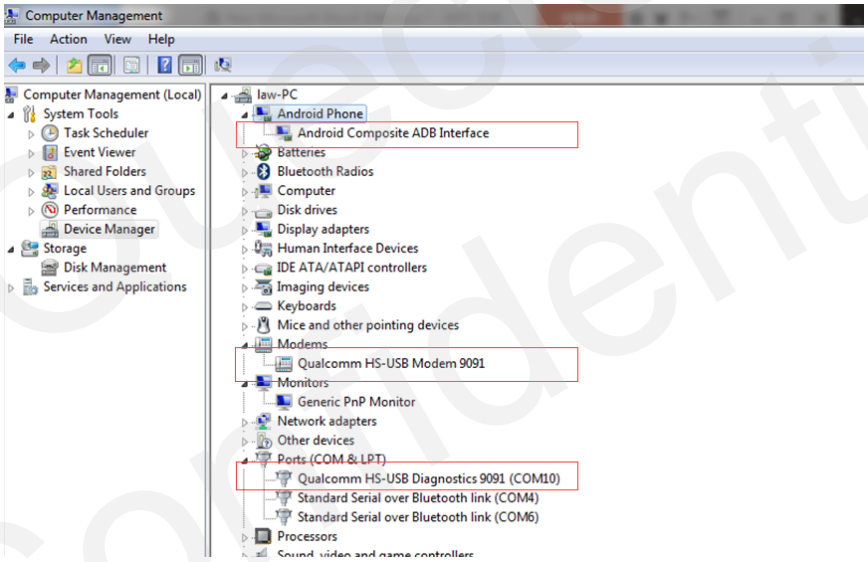

Figure 49: USB COM Ports

3. Open CMD tool: START→ All Programs → Accessory → Command Prompt.

4. Use the "**adb shell**" command to make the module enter into ADB mode. Then customers can use USB ADB interface for test.

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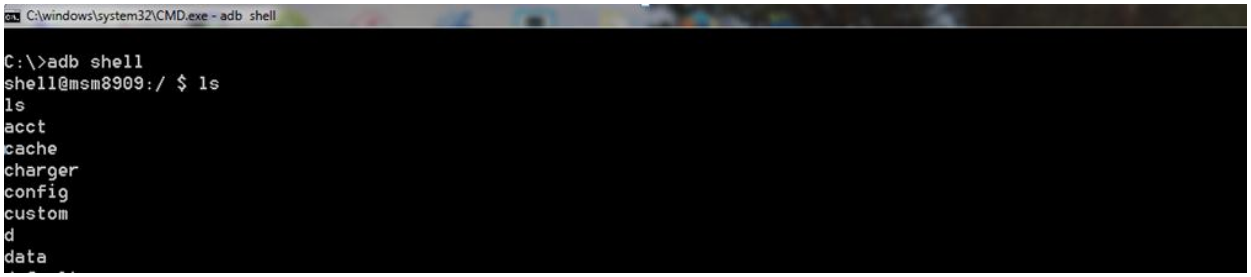

Figure 50: "adb shell" Command

NOTES

1. If customers want to use HyperTerminal for testing, then Qualcomm HS-USB Modem 9091 can be used.
2. Please note that the USB port numbers may be different among different modules.

5.2.2. Communication via UART Interface

1. Run the driver disk on PC to install the USB-to-RS232 driver.

2. Connect the UART interface (main UART or debug UART) to the PC with USB-to-RS232 converter cable and then power on the module according to the procedures mentioned in ***Chapter 5.1***. After that, the USB serial port number can be viewed through the PC Device Manager, shown as the following figure.

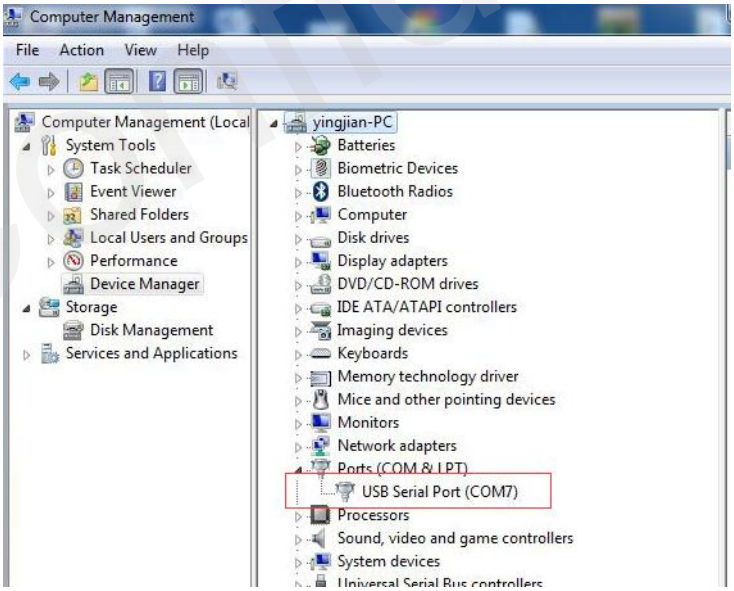

Figure 51: USB Serial Port

3. Install and then use the QCOM tool provided by Quectel to realize the communication between the smart module and the PC. The following figure shows the QCOM configuration: select correct "**COM port**" (USB Serial Port) and set correct "**Baudrate**" (such as 115200bps). For more details about QCOM tool usage and configuration, please refer to ***document [7]***.

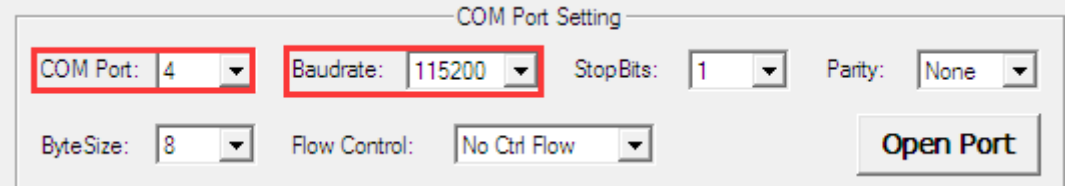

Figure 52: QCOM Configuration When Connecting USB Serial Port

5.3. Firmware Upgrade

Quectel Smart modules upgrade firmware via USB port by default. Please follow the procedures below to upgrade firmware.

1. Install and open the firmware upgrade tool QFIL on PC and then power on the smart module according to the procedures mentioned in ***Chapter 5.1***.
2. Click the "**SelectPort**" and select the USB port "**Qualcomm HS-USB Diagnostics Modem 9091 (COM24)**".
3. Select "**Flat Build**" in "**Select Build Type**" option.
4. Click "**Browse**" to select the firmware which needs to be upgraded in "**Select Programmer**" option.
5. Click "**Load XML**" to select the XML which needs to be upgraded in "**Select Build**" option.
6. Click "**Download**" to upgrade the firmware.

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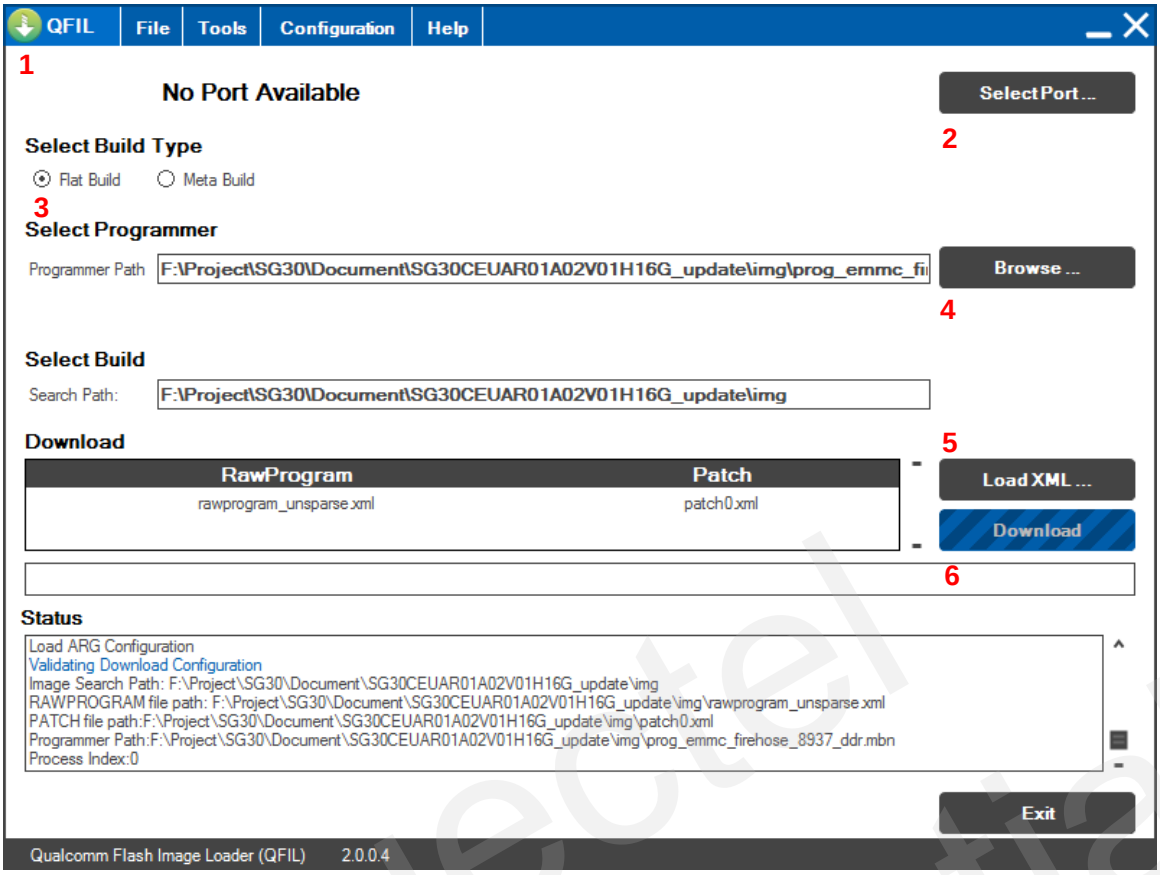

Figure 53: Firmware Upgrade Steps

5.4. Reset Smart Modules

The Smart modules can be reset by pressing S1505 key and then releasing it. This is only used in case of emergency. For example, the software does not respond for more than 5 seconds due to some serious problems.

5.5. Power OFF Smart Modules

There are two methods to power off the module.

- The steps for the first method are as follows:

1. Press S1503 (PWRKEY) for at least 1s under the power-on state of the module, and then LCD will display a menu for selection shown as the following figure:

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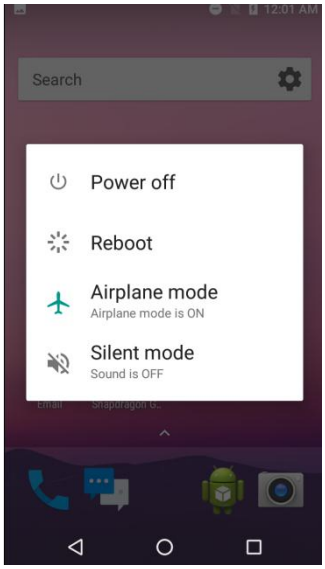

Figure 54: LCD Menu Display for Powering off Module

2. Choose “**Power off**” option.

3. The module will be powered off normally.

- The other method is to press down S1503 (PWRKEY) for at least 8s until the module is shut down completely.

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6 Appendix A References

Table 13: Related Documents

SN	Document name	Remark
[1]	Quectel_SG30_Hardware_Design	SG30 hardware design
[2]	Quectel_SG30_Reference_Design	SG30 reference design
[3]	Quectel_SG36_Hardware_Design	SG36 hardware design
[4]	Quectel_SG36_Reference_Design	SG36 reference design
[5]	Quectel_SC60_Hardware_Design	SC60 hardware design
[6]	Quectel_SC60_Reference_Design	SC60 reference design
[7]	Quectel_QCOM_User_Guide	User guide for QCOM tool

Table 14: Terms and Abbreviations

Abbreviation	Description
ALS	Ambient Light Sensor
CMOS	Complementary Metal Oxide Semiconductor
ECM	Electret Microphone
Smart EVB G2	Smart Evaluation Board 2nd Generation
LCM	LCD Module
LED	Light Emitting Diode
MEMS	Micro-Electro-Mechanical System
MIPI	Mobile Industry Processor Interface
OTG	On-The-Go

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PC	Personal Computer
PS	Proximity Sensor
PWM	Pulse Width Modulation
UART	Universal Asynchronous Receiver & Transmitter
USB	Universal Serial Bus
(U)SIM	(Universal) Subscriber Identity Module
WLED	White LED
ZIF	Zero Insert Force

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