

Smart EVB G5

User Guide

Smart Module Series

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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 shall 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 shall 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 emergent 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 fuelling 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

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-	2022-01-14	Mary SHEN	Creation of the document
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1 Introduction

This user guide describes the application details of the Smart EVB G5 (evaluation board), which is an assistant tool for engineers to develop applications and test basic functions of applicable modules below.

1.1. Applicable Modules

Table 1: Applicable Modules

Model Series
SC200L/SC200E

1.2. Special Mark

Table 2: Special Mark

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

2 Product Overview

2.1. Key Features

Table 3: Key Features

Features	Implementation
Power supply	<ul style="list-style-type: none"> ● DC power supply: 5–36 V (typical: 5 V) ● VBAT: 3.55–4.4 V (typical: 3.8 V)
LCM interfaces	<ul style="list-style-type: none"> ● Two 5-inch 1280 × 720 HD resolution LCDs ● 4-lane MIPI DSI interface for each LCD
Touch panel interfaces	Two capacitive touch panels
Camera interfaces	Support three cameras: <ul style="list-style-type: none"> ● 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	Support USB Type-C interface and Micro-USB interface: <ul style="list-style-type: none"> ● Compliant with USB 3.0 and 2.0 specifications, with transmission rates up to 5 Gbps on USB 3.0 and 480 Mbps on USB 2.0 ● Support USB OTG ● Used for AT command communication, data transmission, software debugging and firmware upgrade
Audio interfaces	<p>Analog Inputs:</p> 3 groups of analog microphone inputs, integrating internal bias voltage. <ul style="list-style-type: none"> ● One headset input ● One ECM-type microphone input ● One MEMS-type microphone input <p>Analog Outputs:</p> 3 groups of analog audio outputs, including: <ul style="list-style-type: none"> ● One stereo headset output ● One mono earphone differential output ● One mono loudspeaker differential amplifier output
(U)SIM card interfaces	<ul style="list-style-type: none"> ● Support (U)SIM cards: 1.8 V and 2.95 V ● Support dual SIM dual standby

UART interfaces	Support two UART interfaces: <ul style="list-style-type: none">● 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
MIPI + SPI/I2S interface*	A group of 4-lane MIPI_DSI interface and SPI/I2S interface
Flashlights	Support 2 flashlight LEDs for testing the module's flashlight function
Sensors	Support three sensors including ALS/PS, accelerometer/gyroscope and geomagnetic sensor
Vibrator	A vibrator for testing the motor drive interface of the module
Switches and buttons	<ul style="list-style-type: none">● 4 switches including two power supply switches, one emergency download switch and one USB selection switch● 4 buttons including PWRKEY, RESET, VOL DOWN and VOL UP
Status indicators	3 LEDs are available for signal indication
Size	26.5 cm × 19.0 cm

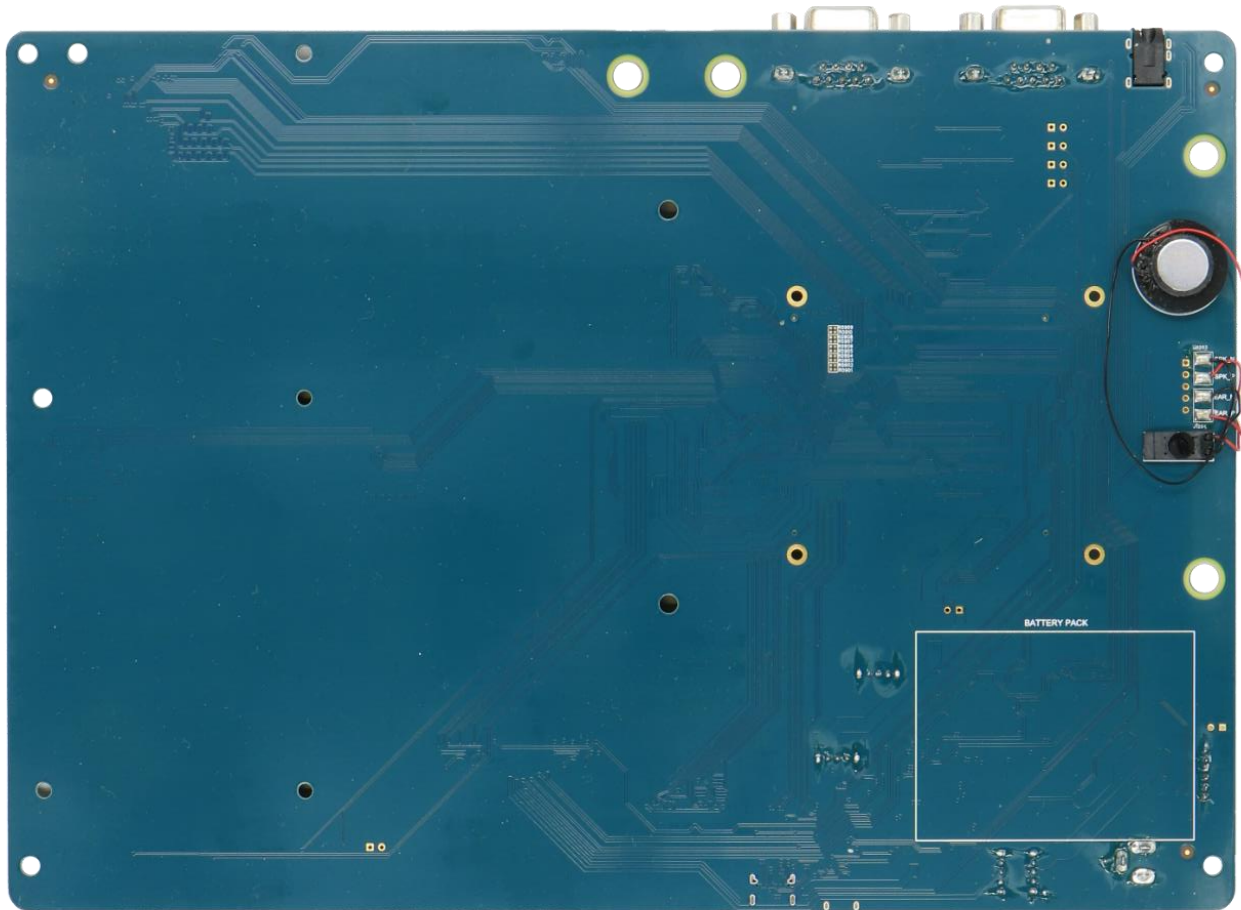


Figure 2: Smart EVB G5 Bottom View

2.3. Component Placement of Smart EVB G5

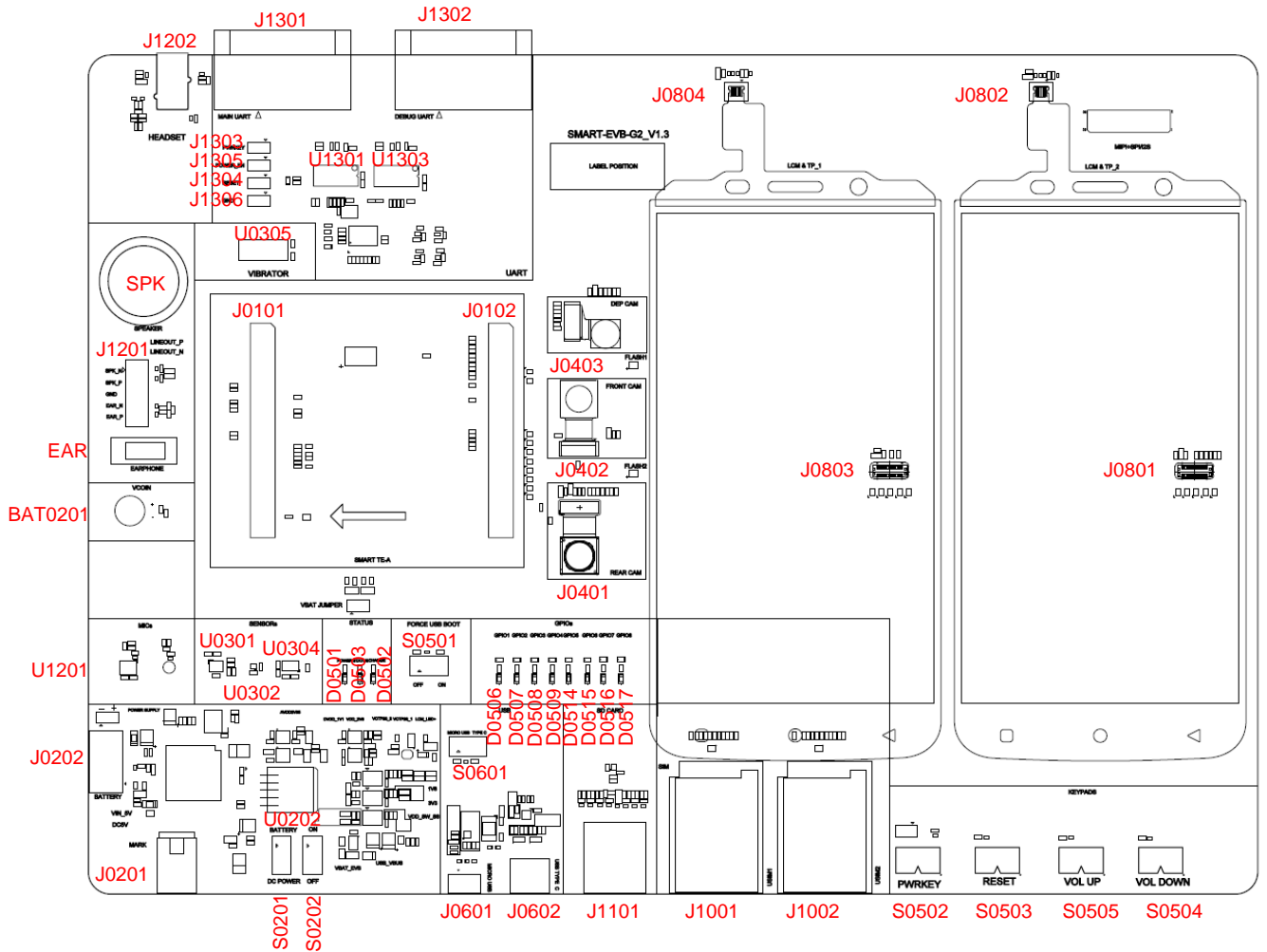


Figure 3: Top View for Component Placement of Smart EVB G5

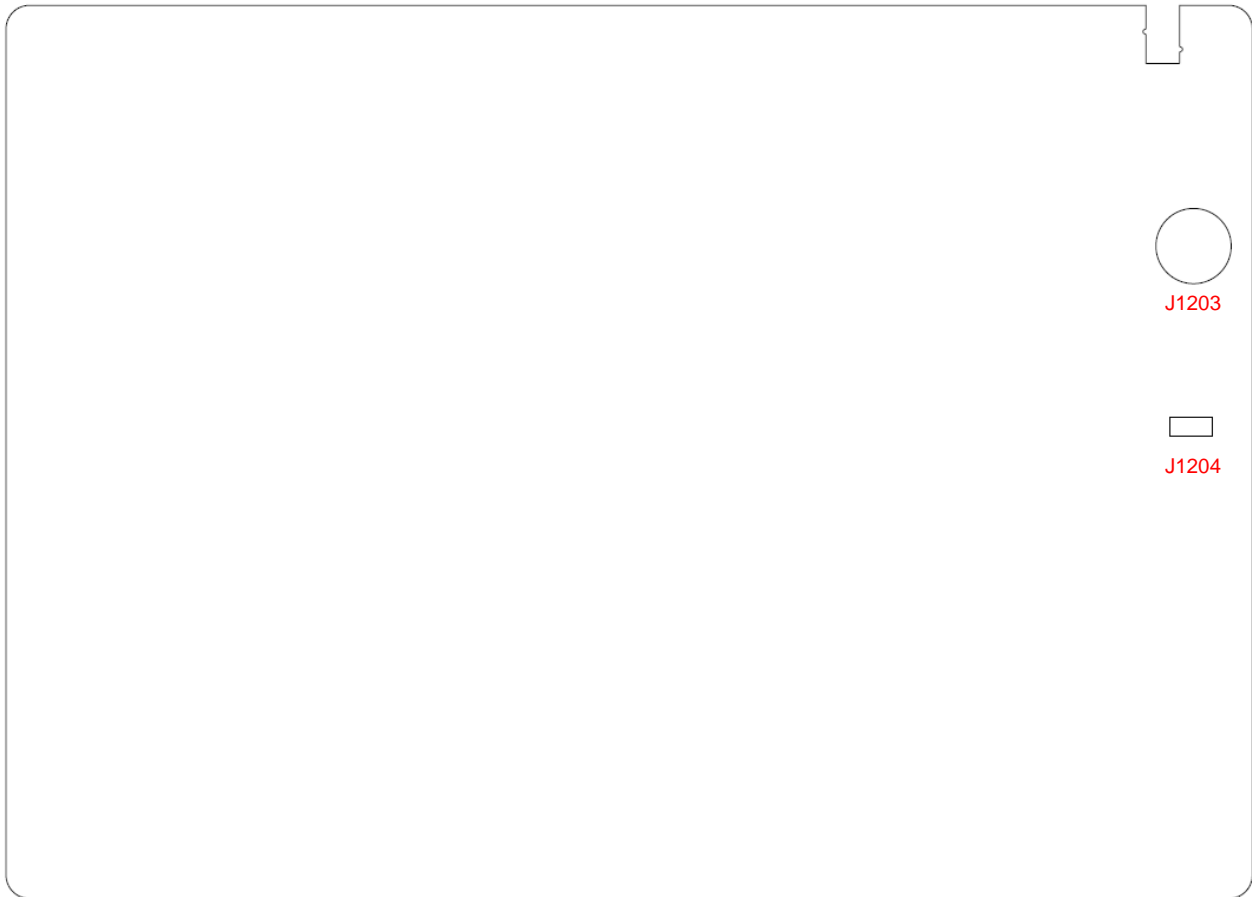


Figure 4: Bottom View for Component Placement of Smart EVB G5

Table 4: Components & Functions of Smart EVB G5

Components	RefDes.	Description
Power supply	J0201	<ul style="list-style-type: none"> ● Power jack on the EVB ● Typical power supply: +5 V
	J0202	<ul style="list-style-type: none"> ● Li-polymer battery connector ● Typical power supply: +3.7 V
Power switches	S0201	Select DC power supply or battery power supply
	S0202	VBAT on/off control
PWRKEY	S0502	<ul style="list-style-type: none"> ● Power key (push button) ● Turn on/off the module
RESET	S0503	<ul style="list-style-type: none"> ● Reset button (push button) ● Reset the module
VOL DOWN	S0504	Turn the volume down

VOL UP	S0505	Turn the volume up
FORCE USB BOOT	S0501	Emergency download
USB interface	J0601	Micro-USB interface
	J0602	USB Type-C interface
Audio interfaces	J1203	<ul style="list-style-type: none"> ● Used for loudspeaker ● Rated resistance: 8 Ω ● Rated power: 1.5 W
	J1204	<ul style="list-style-type: none"> ● Used for earphone ● Rated resistance: 32 Ω ● Rated power: 30 mW
	U1201	Used for MEMS-type microphone
	U1202	Used for ECM-type microphone
	J1202	Audio jack for headset
(U)SIM card interfaces	J1001	(U)SIM1 card connector
	J1002	(U)SIM2 card connector
UART interface	J1301	Main UART for data communication
	J1302	Debug UART for debugging
SD card interface	J1101	SD card connector
Status indicators	D0501	Power supply on/off indicator
	D0502	Charging status indicator
	D0503	Module turn-on/turn-off indicator
Smart TE-A interface	J0101, J0102	Connectors for connecting Smart TE-A with Smart EVB G5
Camera interfaces	J0401	Rear camera connector, support 16M CMOS sensor with auto-focusing function
	J0402	Front camera connector, support 8M CMOS sensor with auto-focusing function
	J0403	Depth camera connector, support 2M CMOS sensor with auto-focusing function
Flashlights	D0301	Flashlight LED1 for testing module's flashlight interface
	D0302	Flashlight LED2 for testing module's flashlight interface

LCM and TP interfaces	J0803	Connector for main LCM
	J0804	ZIF connector for main touch panel
	J0801	Connector for secondary LCM
	J0802	ZIF connector for secondary touch panel
Sensors	U0301	Accelerometer and gyroscope sensor
	U0302	Geomagnetic sensor
	U0304	Ambient light sensor (ALS) and proximity sensor (PS)
Vibrator	U0305	Test module's motor driver interface
Coin cell	BAT0201	Coin cell battery for RTC power supply
MIPI + SPI/I2S interface*	J0902	A group of 4-lane MIPI_DSI interface and SPI interface

3 Smart EVB G5 Kit Accessories

3.1. Accessories Assembly



Figure 5: Smart EVB G5 and Accessories

NOTE

The assembly method shown in the figure above is for reference only.

3.2. List of Accessories

All accessories of Smart EVB G5 kit are listed as below. Please contact the supplier if there is something missing.



Figure 6: Smart EVB G5 Kit Accessories

Table 5: Accessories List

Items	Description	Quantity (pcs)
Power adapter	5 V DC power supply	1
Cables	USB to RS-232 converter cable	1
	USB Type-C cable	1
	RF cables	4
Antennas	Main antennas	2
	Wi-Fi/Bluetooth antenna	1

	GNSS antenna (passive)	1
Audio	Headset	1
USB flash disk	USB 2.0 to RS-232 driver USB driver Related tools for modules	1
Bolts and Nuts	Bolts and coupling nuts for fixing Smart EVB G5	4 for each
Instruction Sheet	A sheet of paper giving instructions for EVB connection, details of EVB accessories, etc.	1

NOTE

The main antennas can also be used for diversity reception.

4 Interface Application

This chapter describes the hardware interfaces of Smart EVB G5, as listed below:

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

It also provides information about flashlights, sensors, vibrator, switches and buttons, status indicators and test points to help customers use the Smart EVB G5.

4.1. Power Supply

The Smart EVB G5 can be powered by an external 5 V DC power adapter through the power jack J0201 and the step-down converter (DC-DC converter), which is used to convert 5 V DC power supply voltage to 4.0 V for powering up the module.

The Smart EVB G5 can also be powered by a 3.7 V Li-polymer battery through the battery connector J0202 on the EVB.

Table 6: Description of Power Supply

RefDes.	Description
J0201	Power jack on the EVB
J0202	Li-polymer battery connector

The following figure shows the simplified power supply block diagram and power interfaces of Smart EVB G5.

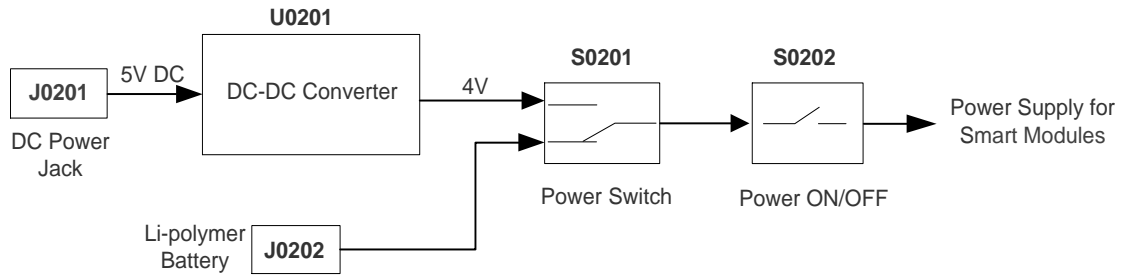


Figure 7: Simplified Power Supply Block Diagram of Smart EVB G5

4.1.1. Adapter Interface

The following figure shows the DC power jack of the Smart EVB G5.

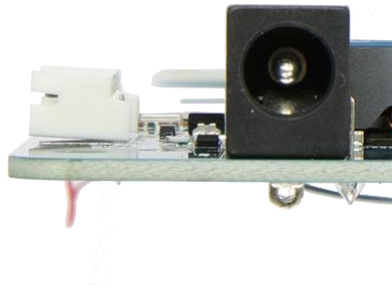


Figure 8: 5 V DC Power Jack

When the power jack is used for power supply, the power plug design of the adapter is shown as below.

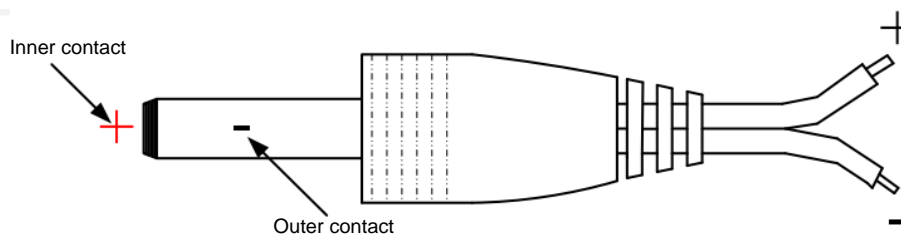


Figure 9: Power Plug Design

4.1.2. Battery Interface

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

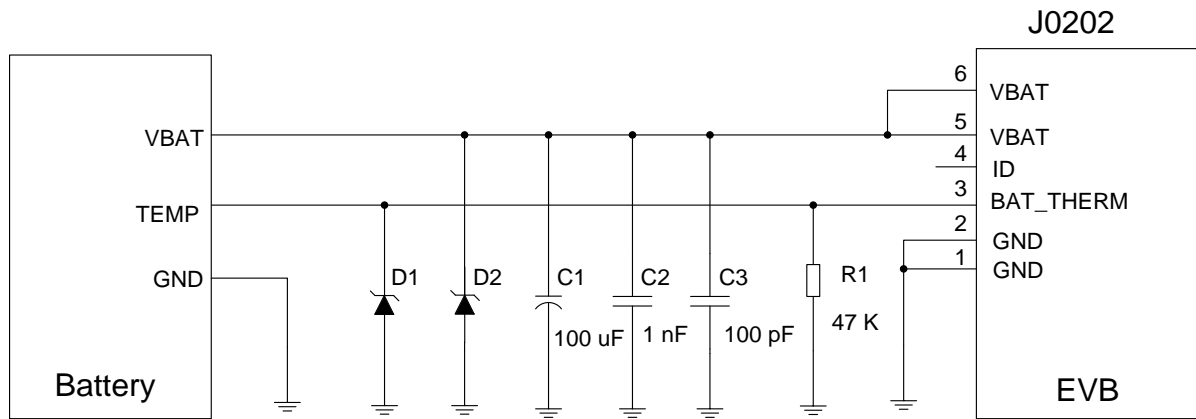


Figure 10: Reference Design for Battery Interface

The following figure shows the pin assignment of battery interface. The following table shows the pin definition of the battery connector.

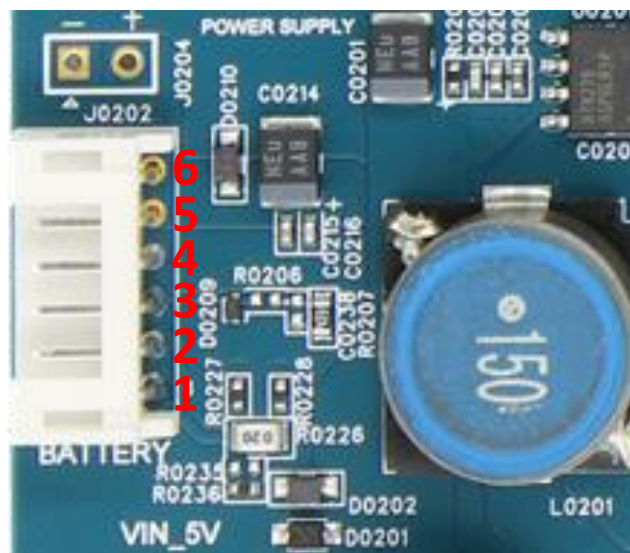


Figure 11: Pin Assignment of Battery Interface

Table 7: Pin Definition of Battery Interface

Pin No.	Pin Name	Description
1, 2	GND	GND pins Connected to the negative pole of the battery
3	THERM	Detect battery temperature A 47K thermistor is used for the battery protection circuit
4	ID	Reserved
5, 6	VBAT	Power input pins Connect to the positive pole of the battery

4.2. Smart TE-A Interface

The Smart TE-A interface includes two B2B connectors J0101 and J0102. Smart TE-A is connected to the EVB via the two connectors.

Table 8: Description of Smart TE-A Interface

RefDes.	Description
J0101	Connectors for connecting Smart TE-A with Smart EVB G5
J0102	

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

Table 9: Pin Definition of B2B Connector J0101

Pin No.	Pin Name
1, 11, 37, 71, 83, 90, 94, 101, 103, 104, 109–111, 116, 122, 127–129, 134, 139, 140	GND
2	LCD_RST1
3	UART1_CTS
4	GPIO5
5	UART1_RXD
6	INT_CC
7	UART1_RTS
8	TP2_HDMI_RST
9	UART1_TXD
10, 16, 21, 23, 25–27, 29, 31–33, 35,39, 41–44, 46–48, 51, 55, 57, 62–64,97, 118, 130	NC
12, 14	VDD_3V3
13	UART2_CTS
15	UART2_RXD
17	UART2_RTS
18	GPIO_1
19	UART2_TXD
20	GPIO2
22	GPIO3
24	GPIO4
28	TP0101
30	TP0102

34	CC1
36	CC2
38, 105, 107	USB_VBUS
40, 56	SEL_SW
45	SD_LDO12
49	LDO2_1V1
50	I2S_MCLK/LCD_TE1
52	TP2_CC_HDMI_I2C_SDA
53	CS_PLUS
54	TP2_CC_HDMI_I2C_SCL
55	CS_MINUS
58	CHG_LED
59	PMU_MPP2
60	GRENN_LED
61	DSI_PWM
65	CS_N
66	MAG_INT
67	CS_P
68	TP2_HDMI_INT
69	FORCE_USB_BOOT
70	GPIO_8
72	CAM_1V2_EN
73	HAP_P
74	SENSOR_I2C_SCL
75	HAP_N

76	SENSOR_I2C_SDA
77	LCD_BL_A
78	GYROSCOPIC_INT
79	LCD_BL_K1
80	FSYNC/INT2
81	LCD_BL_K2
82	ALPS_INT
84	GPIO_7
85	LDO23_1V2
86	LCD_BL_K3
87	LDO5_1V8
88	LCD_BL_K4
89	LDO6_1V8
91	LDO10_2V8
92	FM_ANT
93	LDO22_2V8
95	LDO17_2V85
96	HPH_R
98	HPH_REF
99	VRTC
100	HPH_L
102	HS_DET
106	SPK_P
108	SPK_N
112	EAR_P

113, 115, 117, 119, 121, 123, 125	VBAT
114	EAR_N
120	MIC_BIAS1
124	MIC_GND
126	MIC3_P
131	BATT_MINUS
132	MIC2_P
133	BATT_PLUS
135	VBAT_SNS
136	MIC1_N
137	BAT_THERM
138	MIC1_P

Table 10: Pin Definition of B2B Connector J0102

Pin No.	Pin Name
1	USIM1_VDD
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	USIM1_DET
4	DSI1_LN3_P
5	USIM1_RST
6	DSI1_LN3_N
7	USIM1_CLK
9	USIM1_DATA
10	DSI1_LN2_N
11	USIM2_VDD

12	DSI1_LN2_P
13	USIM2_DET
15	USIM2_RST
16	DSI1_LN1_N
17	USIM2_CLK
18	DSI1_LN1_P
19	USIM2_DATA
22	DSI1_LN0_N
24	DSI1_LN0_P
28	DSI1_CLK_N
30	DSI1_CLK_P
34	TP_RST
36	TP_INT
37	DSI0_LN3_P
38	TP_I2C_SCL(TP2_CC_HDMI_I2C_SCL)
39	DSI0_LN3_N
40	TP_I2C_SDA(TP2_CC_HDMI_I2C_SDA)
42	LCD_TE
43	DSI0_LN2_P
44	LCD_RST
45	DSI0_LN2_N
46	GPIO_16
48	I2S_MCLK
49	DSI0_LN1_P
50	CTP_EN
51	DSI0_LN1_N

52	SPI_CLK_I2S_CLK
54	SPI_MISO_I2S_D1
55	DSIO_LN0_P
56	SPI_MOSI_I2S_D0
57	DSIO_LN0_N
58	SPI_CS_I2S_WS
60	GPIO1_EXT
61	DSIO_CLK_P
62	GPIO2_EXT
63	DSIO_CLK_N
67	PWRKEY
68	EN_AVDD_CAM
69	RESET_N
71	PMI_MPP1
75	CSI1_LN1_P
77	CSI1_LN1_N
78	SCAM_PWDN
80	SCAM_RST
81	CSI1_LN0_P
82	CAM_I2C_SDA
83	CSI1_LN0_N
84	CAM_I2C_SCL
86	MCAM_PWDN
87	CSI1_CLK_P
88	MCAM_RST
89	CSI1_CLK_N

93	CSI0_LN3_P
95	CSI0_LN3_N
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
110	GPIO_6
111	CSI0_LN0_P
112	USB_OTG_PWR_EN
113	CSI0_LN0_N
116	DM
117	CSI0_CLK_P
118	DP
119	CSI0_CLK_N
122	TX_M
123	SD_LDO11
124	TX_P
122	TX_M
123	SD_LDO11
124	TX_P
125	SD_CMD

127	SD_DET
128	RX_M
129	SD_CLK
130	RX_P
131	SD_DATA0
133	SD_DATA1
135	SD_DATA2
136	KEY_VOL_DOWN
137	SD_DATA3
138	KEY_VOL_UP
25, 27, 31, 33, 64, 66, 70, 72, 74, 76, 92, 134, 140	NC

4.3. LCM Interfaces

The Smart EVB G5 provides two LCM interfaces and can be equipped with two LCD modules for dual display function. Currently, the Smart EVB G5 provides two 5-inch 1280 × 720 HD resolution liquid crystal displays for customers to test.

Table 11: Description of LCM Interfaces

RefDes.	Description
J0803	Connector for main LCM
J0801	Connector for secondary LCM

4.3.1. Main LCM Interface

The following figure shows a reference circuit design for main LCM interface of the Smart EVB G5.

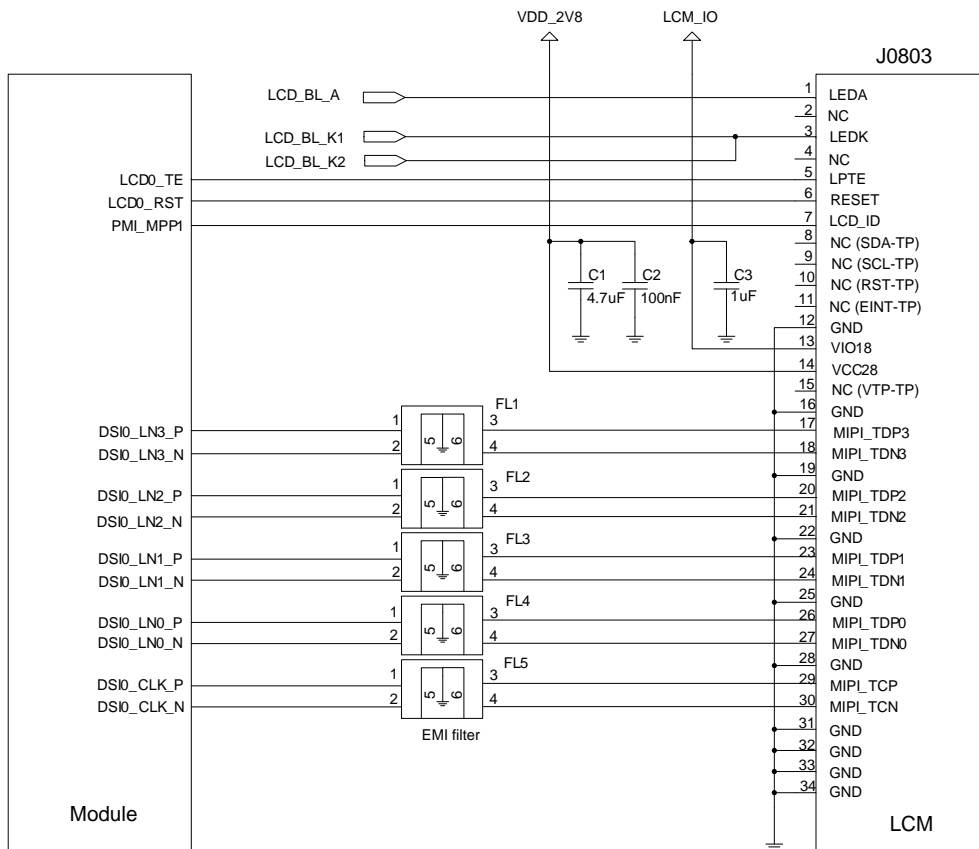


Figure 14: Reference Design for Main LCM Interface

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 G5.

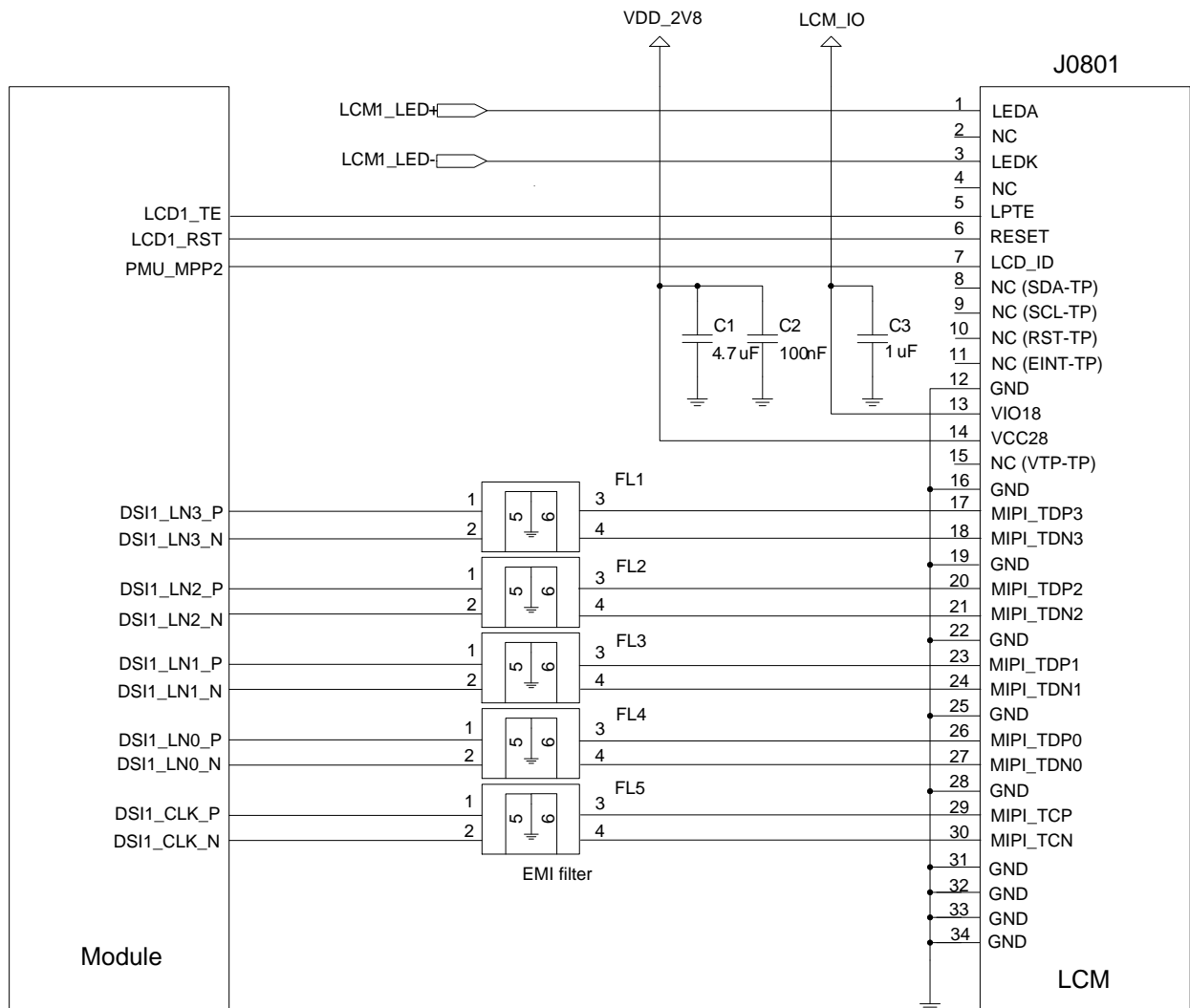


Figure 15: Reference Design for Secondary LCM Interface

The following figure shows the pin assignments of LCM interfaces.

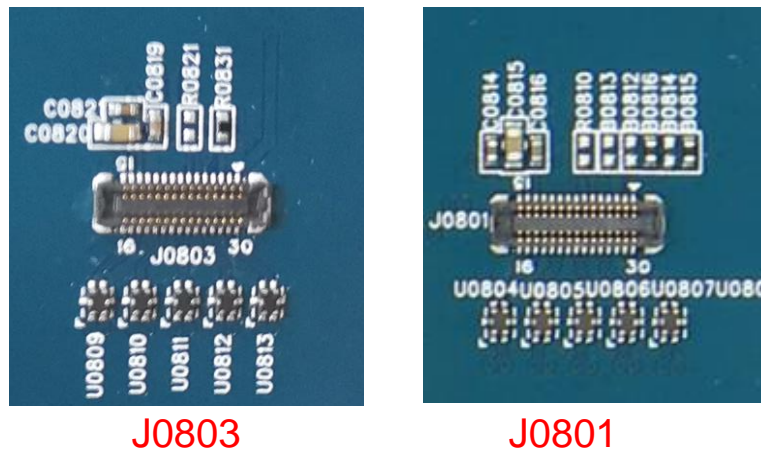


Figure 16: Pin Assignments of LCM Interfaces

4.3.3. Backlight Driver for Secondary LCM Interface

The Smart EVB G5 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.

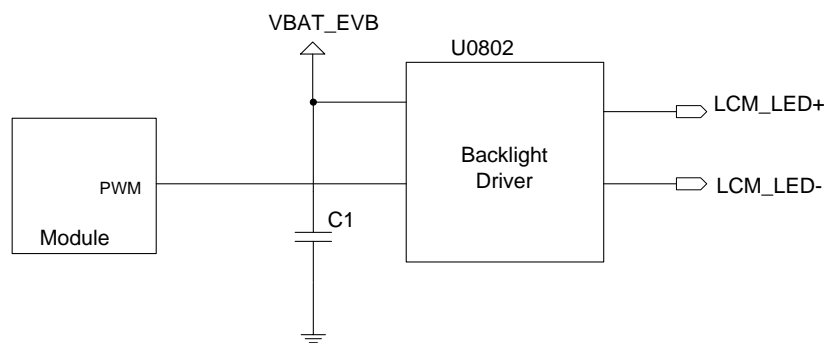


Figure 17: Reference Design for Backlight Driver

4.4. Touch Panel Interfaces

The Smart EVB G5 provides two touch panel interfaces:

Table 12: Description of Touch Panel Interfaces

RefDes.	Description
J0804	ZIF connector for main touch panel
J0802	ZIF connector for secondary touch panel

The following figure shows a reference design for touch panel interfaces.

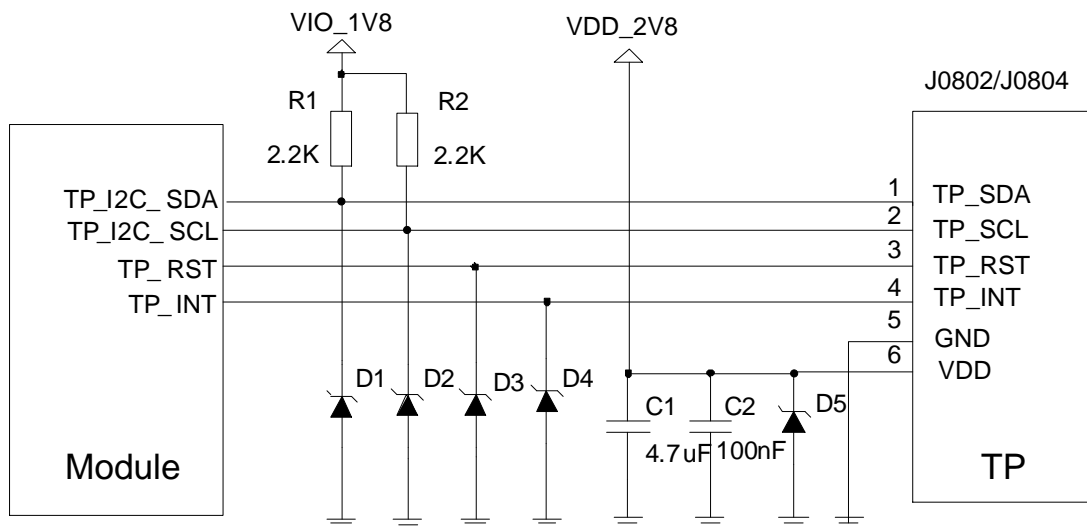


Figure 18: Reference Design for Touch Panel Interfaces

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

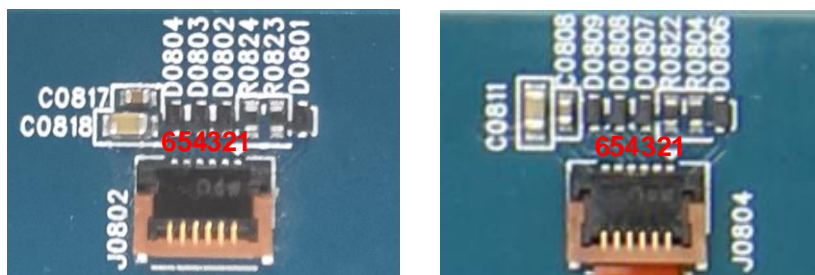


Figure 19: Pin Assignments of Touch Panel Interfaces

Table 13: Pin Definition of Touch Panel Interfaces

Pin No.	Pin Name	Description
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
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 G5 provides three camera interfaces (4-lane + 2-lane + 1-lane) with rear camera, front camera and depth camera assembled.

Table 14: Description of Camera Interfaces

RefDes.	Description
J0401	Rear camera connector, support 16M CMOS sensor with auto-focusing function
J0402	Front camera connector, support 8M CMOS sensor with auto-focusing function
J0403	Depth camera connector, support 2M CMOS sensor with auto-focusing function

The following figure shows a reference design for camera interfaces.

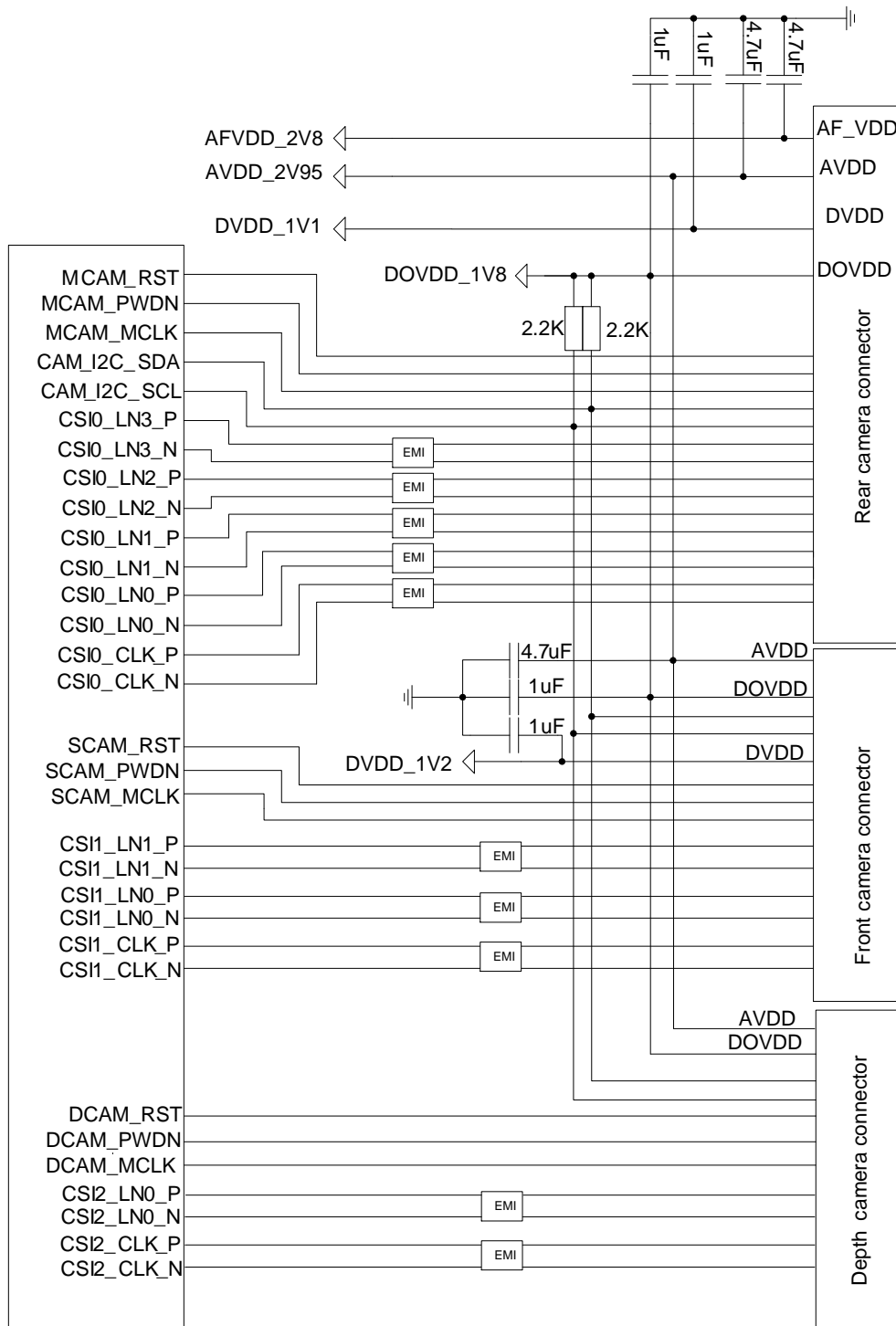


Figure 20: Reference Design for Camera Interfaces

The following figure shows the camera interfaces with cameras assembled.

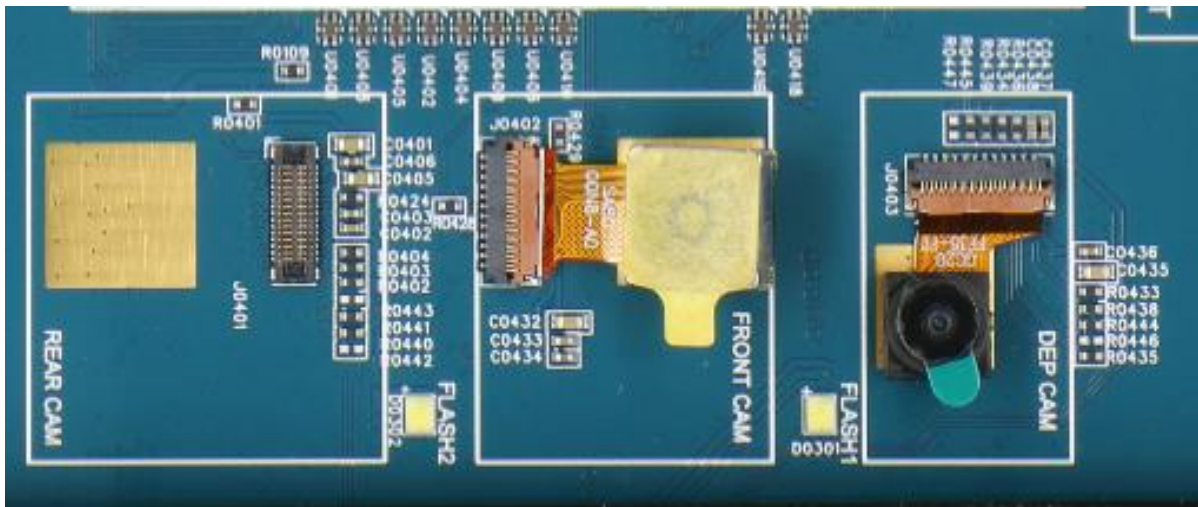


Figure 21: Camera Interfaces with Cameras Assembled

4.6. USB Interfaces

The Smart EVB G5 provides two USB interfaces: a micro-USB interface and a type-C interface.

Table 15: Description of USB Interfaces

RefDes.	Description
J0601	Micro-USB interface
J0602	USB type-C interface

- The Type-C interface complies with the USB 3.0 specifications and supports super-speed (5 Gbps) on USB 3.0, high-speed (480 Mbps) on USB 2.0 and full-speed (12 Mbps) modes. USB Type-C interface support USB OTG function, and is used for AT command communication, data transmission, software debugging and firmware upgrade.
- The Micro-USB interface complies with the USB 2.0 specifications and supports high-speed (480 Mbps) on USB 2.0 and full-speed (12 Mbps) modes.

Table 16: Description of Audio Interfaces

RefDes.	Description
J1203	<ul style="list-style-type: none"> ● Used for loudspeaker ● Rated resistance: 8 Ω ● Rated power: 1.5 W
J1204	<ul style="list-style-type: none"> ● Used for earphone ● Rated resistance: 32 Ω ● Rated power: 30 mW
U1201	Used for MEMS-type microphone
U1202	Used for ECM-type microphone
J1202	Audio jack for headset

4.7.1. Loudspeaker Interface

Smart EVB G5 provides one loudspeaker interface and the loudspeaker is soldered onto the Smart EVB G5 via test point J1203. The following figure shows a reference circuit design for loudspeaker interface.

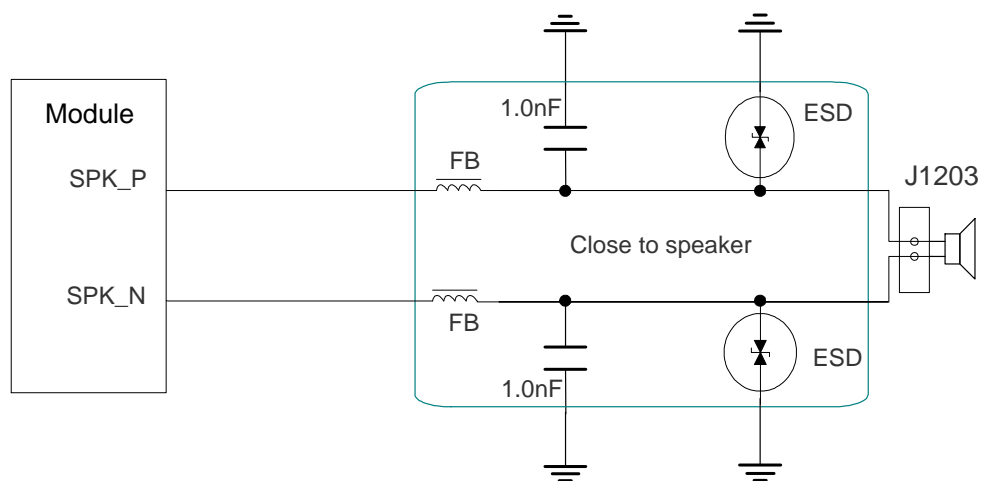


Figure 24: Reference Design for Loudspeaker Interface

4.7.2. Headset Interface

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

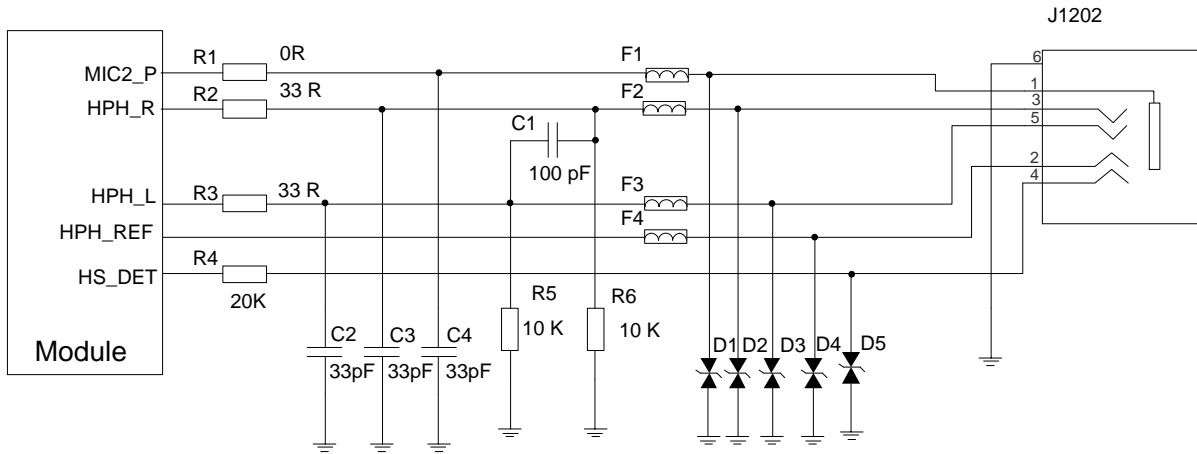


Figure 25: Reference Design for Headset Interface

The following figure shows the pin assignment of headset interface.

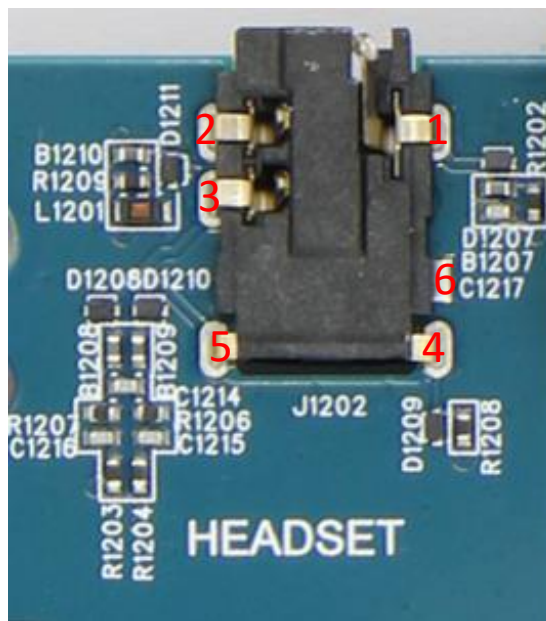


Figure 26: Pin Assignment of Headset Interface

The following table shows the pin definition of headset interface.

Table 17: Pin Definition of Headset Interface

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

The following figure shows the sketch design of audio plug which suits for the audio jack on Smart EVB G5.

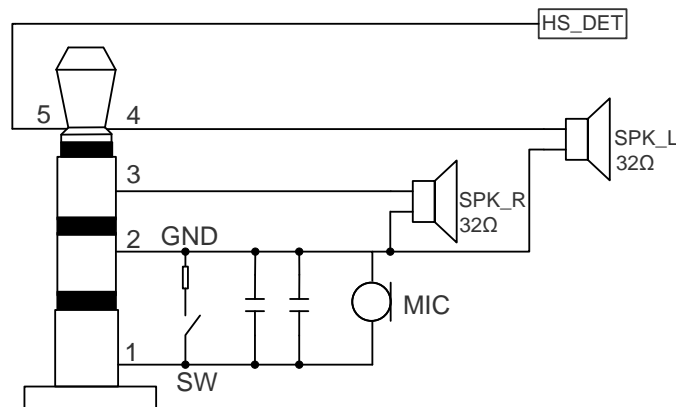


Figure 27: Sketch of Audio Plug

4.7.3. Earphone Interface

Smart EVB G5 provides one earphone interface and the earphone is soldered onto the Smart EVB G5 via test point J1204. The following figure shows a reference circuit design for earphone interface.

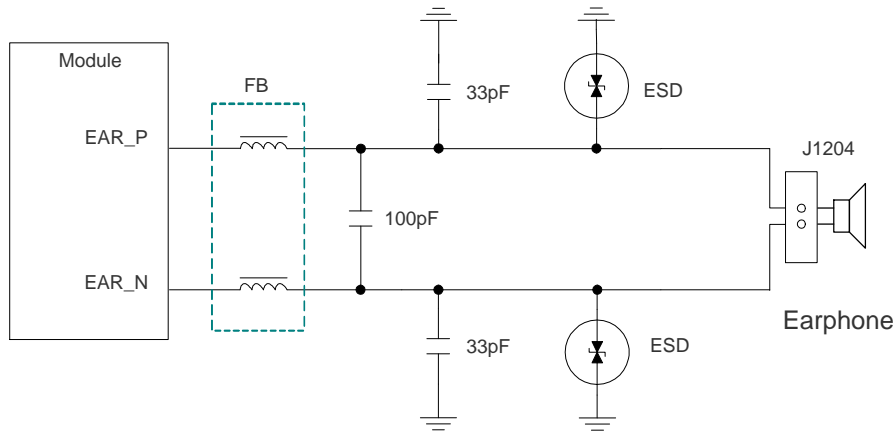


Figure 28: Reference Design for Earphone Interface

4.7.4. Microphone Interfaces

Smart EVB G5 provides one single-ended microphone input and one differential microphone input 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.

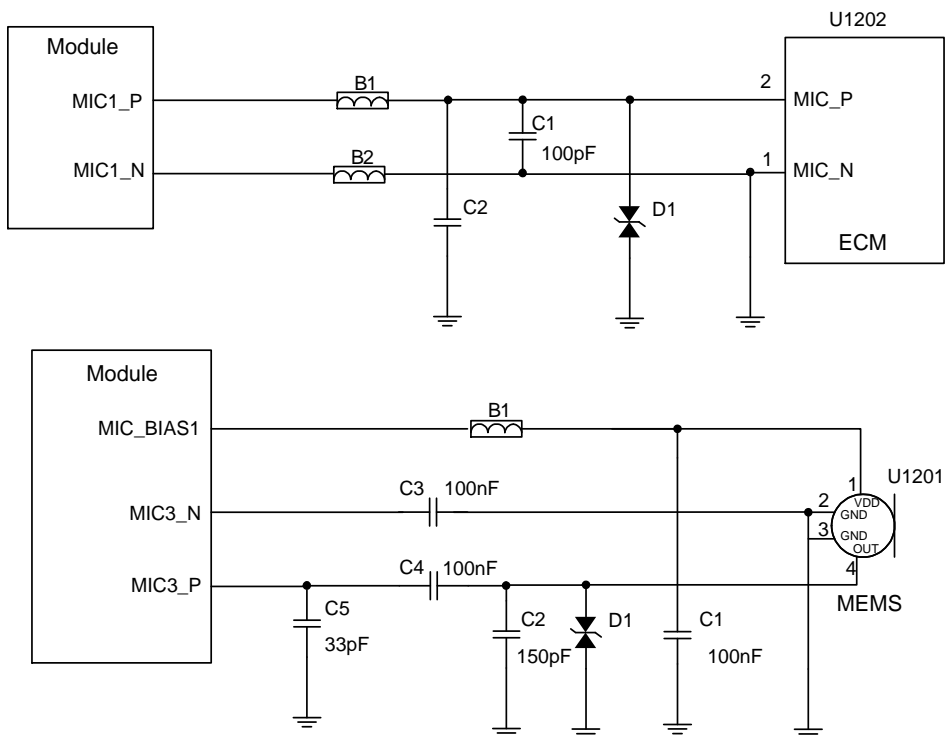


Figure 29: Reference Design for Microphone Interfaces

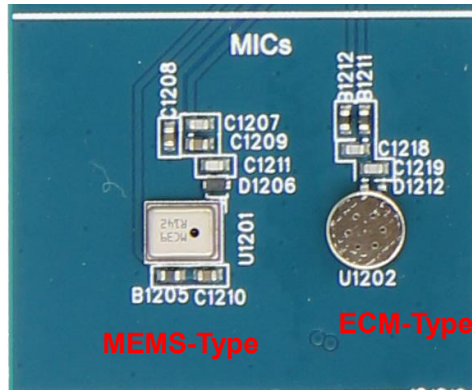


Figure 30: MEMS-Type and ECM-Type Microphones

4.8. (U)SIM Card Interfaces

The Smart EVB G5 provides two 6-pin push-push type (U)SIM card (1.8/2.95 V) connectors which support 1.8/2.95 V (U)SIM card.

Table 18: Description of (U)SIM Card Interfaces

RefDes.	Description
J1001	(U)SIM1 card connector
J1002	(U)SIM2 card connector

The following figure shows the simplified interface schematic for J1001.

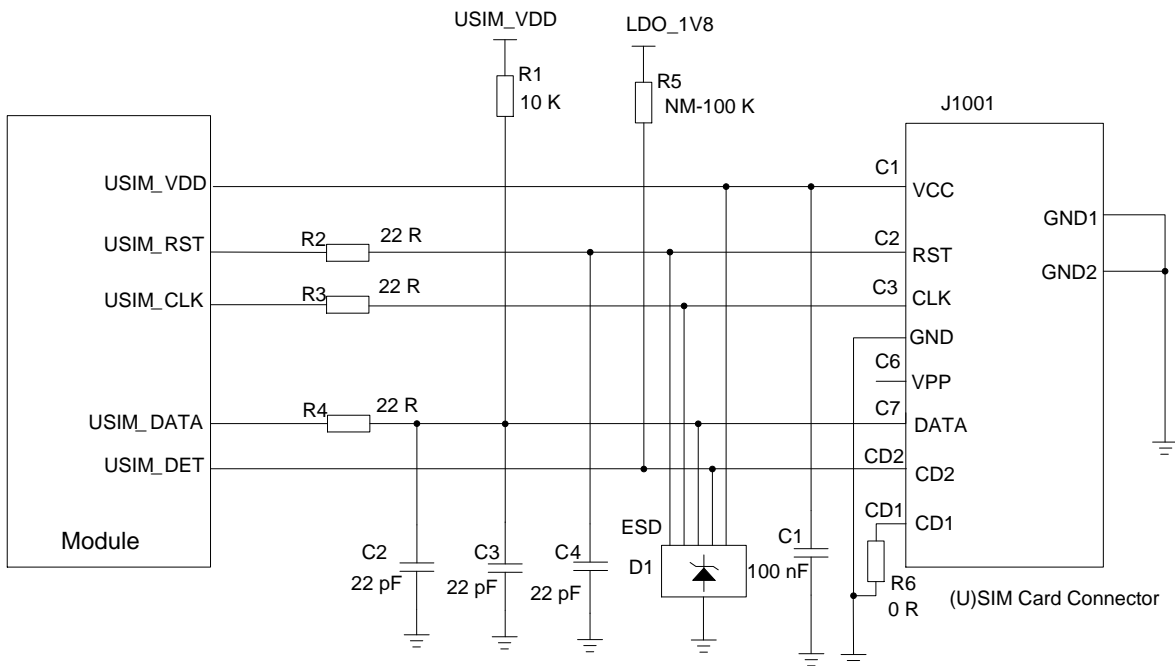


Figure 31: Reference Circuit for (U)SIM Interface with (U)SIM1 Card Connector

The following figure shows the pin assignments of (U)SIM1 card connector (J1001) and (U)SIM2 card connector (J1002).

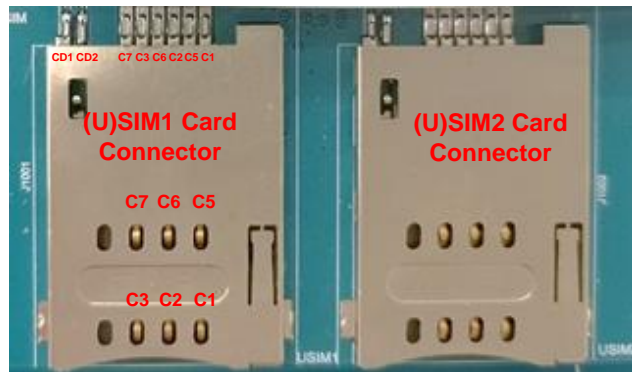


Figure 32: Pin Assignment of J1001 and J1002

Table 19: Pin Definition of (U)SIM1 Card Connector

No.	Pin Name	Description
C1	USIM_VDD	U(SIM) card power supply, provided by module

C2	USIM_RST	U(SIM) card reset
C3	USIM_CLK	U(SIM) card clock
C5	GND	Ground
C6	VPP	NC
C7	USIM_DATA	(U)SIM card data
CD1	USIM_GND	GND
CD2	USIM_DET	U(SIM) card insertion detection

NOTE

The reference circuit and pin assignment of J1002 are the same as J1001's.

4.9. UART Interfaces

Smart EVB G5 provides two UART interfaces: main UART and debug UART. The main UART interface can be used for data transmission and AT command communication. The debug UART interface is used for debugging.

Table 20: Description of UART Interfaces

RefDes.	Description
J1301	Main UART for data communication
J1302	Debug UART for debugging

The following figure shows the block diagram of the UARTs on Smart EVB G5.

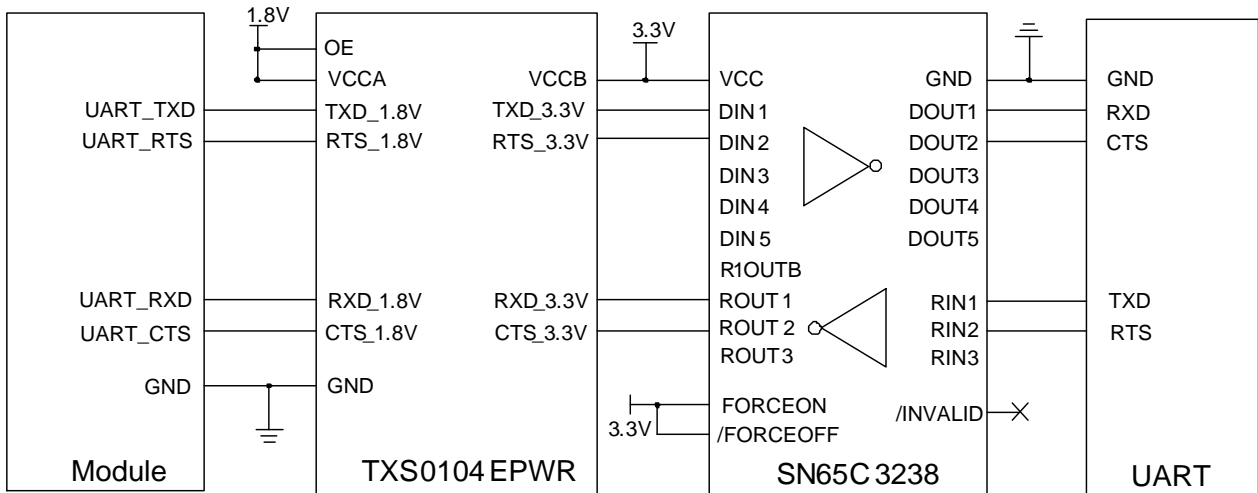


Figure 33: RS-232 Level Match Circuit

The following figure shows the pin assignments of main UART and debug UART.

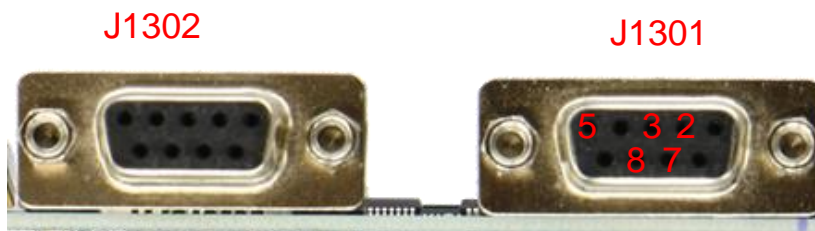


Figure 34: Pin Assignments of Main UART and Debug UART

Table 21: Pin Definition of Main UART

Pin No.	Pin Name	Description
2	Main_UART_TXD	Transmit data
3	Main_UART_RXD	Receive data
5	Main_UART_GND	Ground
7	Main_UART_CTS	Clear to send
8	Main_UART_RTS	Request to send

NOTE

The level match circuit and pin assignment of J1302 are the same as those of J1301.

4.10. SD Card Interface

Smart EVB G5 provides an SD card interface for customers to test the module's SD card interface.

Table 22: Description of SD Card Interface

RefDes.	Description
J1101	SD card connector

The following figure shows the simplified interface schematic for SD card interface on Smart EVB G5.

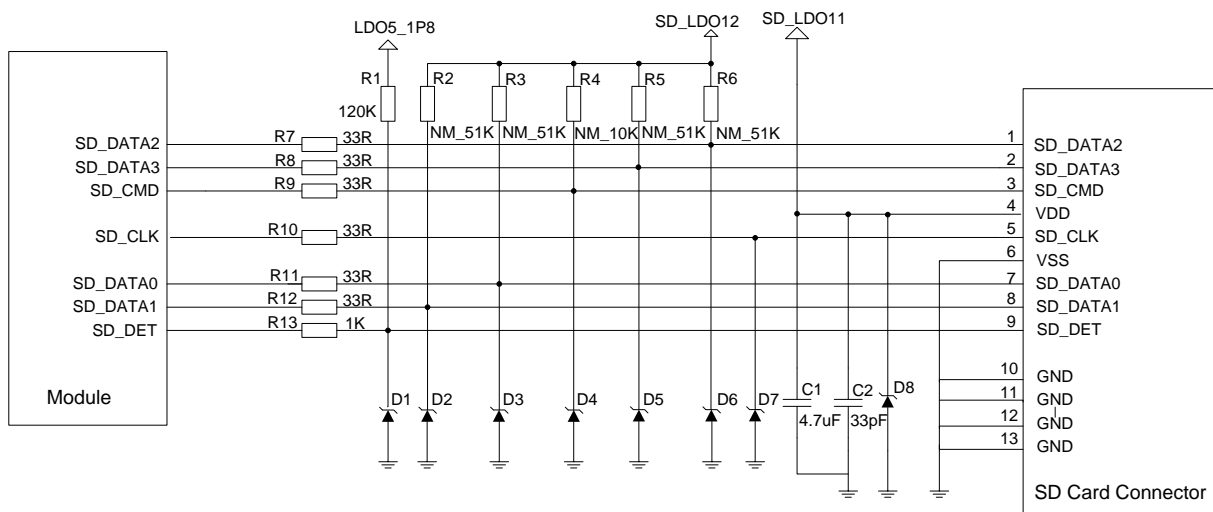


Figure 35: Simplified Interface Schematic for SD Card Interface

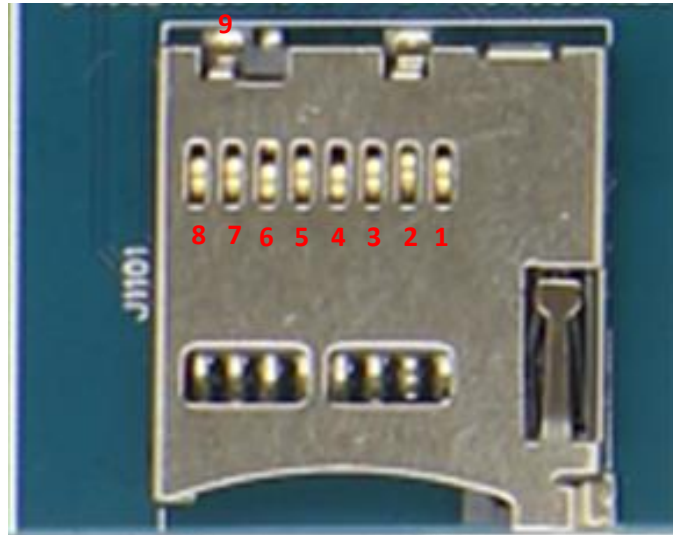


Figure 36: Pin Assignment of SD Card Interface

Table 23: Pin Definition of SD Card Connector

Pin No.	Pin Name	Description
1	SD_DATA2	SDIO data bit 2
2	SD_DATA3	SDIO data bit 3
3	SD_CMD	SD card command
4	VDD	SD card power supply
5	SD_CLK	SD card clock
6	VSS	power ground (GND)
7	SD_DATA0	SDIO data bit 0
8	SD_DATA1	SDIO data bit 1
9	SD_DET	SD card hot-plug detect
10–13	GND	GND

4.11. Flashlights

Smart EVB G5 provides two flashlight LEDs for testing the module's flashlight interfaces which support flash mode and torch mode.

Table 24: Description of Flashlight

RefDes.	Description
D0301	Flashlight LED1 for testing module's flashlight interface
D0302	Flashlight LED2 for testing module's flashlight interface

The following figures show a reference circuit design for flashlights and their locations on Smart EVB G5.

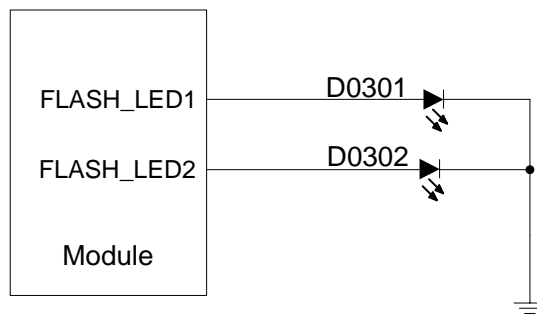


Figure 37: Reference Circuit Design for Flashlight Interfaces

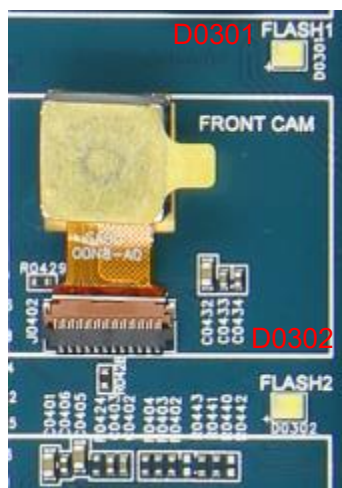


Figure 38: Flashlights

4.12. Sensors

Smart EVB G5 provides three sensors for testing purpose, as shown in the table and figure below.

Table 25: Description of Sensors

RefDes.	Description
U0301	Accelerometer and gyroscope sensor
U0302	Geomagnetic sensor
U0304	Ambient light sensor (ALS) and proximity sensor (PS)

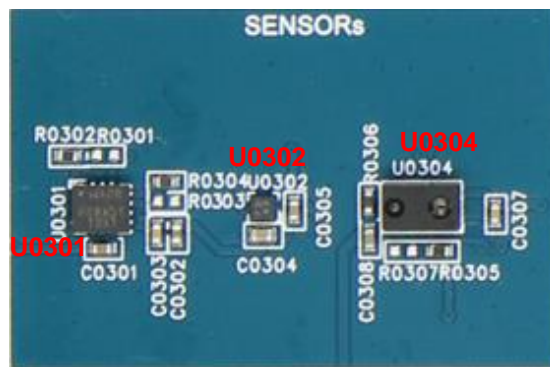


Figure 39: Sensors

4.13. Emergency Download Interface

Smart EVB G5 provides one emergency download interface FORCE USB BOOT to force the module to enter emergency download mode. Pull up USB_BOOT to 1.8 V before powering on the module when the function is used.

The following figures show a reference circuit design for the emergency download interface.

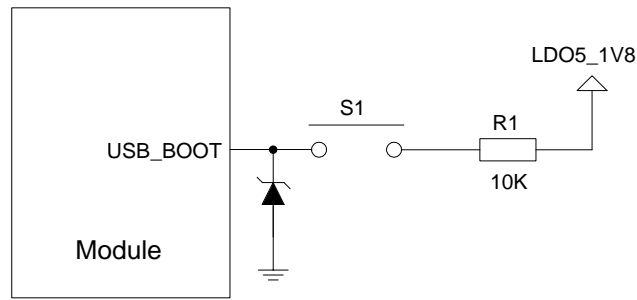


Figure 40: Reference Design for USB_BOOT

4.14. Vibrator

Smart EVB G5 provides an ERM-type vibrator for customers to test the motor driver interface of Smart modules.

Table 26: Description of Vibrator

RefDes.	Description
U0305	Test module's motor driver interface.

The following figures show a reference circuit design and the vibrator on the board.

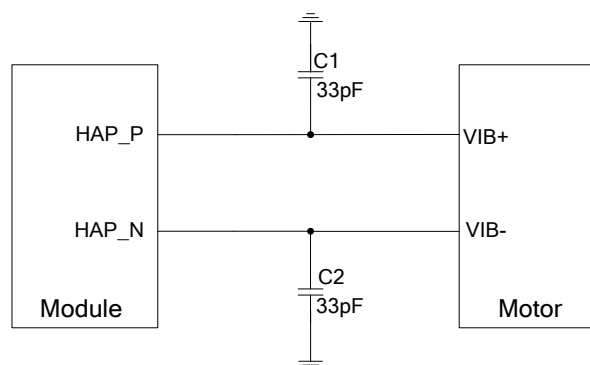


Figure 41: Reference Design for Vibrator



Figure 42: ERM-Type Vibrator

4.15. Switches and Buttons

Smart EVB G5 includes four switches and four buttons, which are illustrated in the following tables and figures.

Table 27: Description of Switches

RefDes.	Description
S0201	Used to select DC power supply or battery power supply
S0202	Used for VBAT on/off control
S0501	Used for enable emergency download function
S0601	Used to select Micro USB or USB Type-C

Table 28: Description of Buttons

RefDes.	Description
S0502	Turn on/off the module
S0503	Used to reset the module
S0504	Turn the volume down
S0505	Turn the volume up

The switches are shown in following figures.

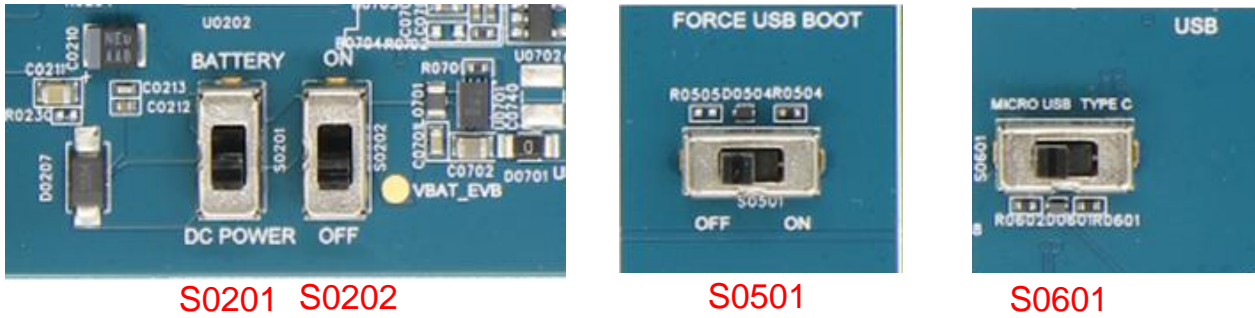


Figure 43: Switches

Smart EVB G5 provides four buttons S0502, S0503, S0504 and S0505, which are PWRKEY, RESET, VOL DOWN and VOL UP respectively. The buttons are shown in the following figure.



Figure 44: Buttons

4.16. Status Indicators

There are three status indication LEDs on Smart EVB G5, illustrated as below.

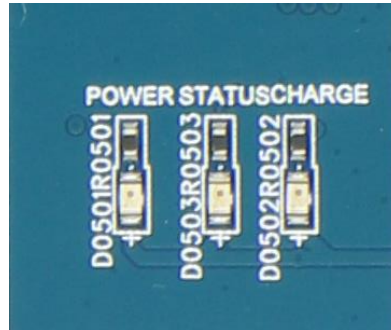
Table 29: Description of Status Indication LEDs

RefDes.	Description
D0501	Indicates whether the power supply for EVB is on <ul style="list-style-type: none"> ● Bright: VBAT ON ● Extinct: VBAT OFF
D0502	Indicates whether the module is being charged <ul style="list-style-type: none"> ● Bright: module is being charged

- Extinct: module stops being charged

D0503

Indicates whether the module is turned on

**Figure 45: Status Indicators**

5 Operation Procedures

This chapter introduces how to use the Smart EVB G5 for testing and evaluation of applicable modules. Before the procedures below, please ensure modules and the EVB are correctly assembled.

5.1. Turn On the Module

Step 1: Connect the module TE-A to the Smart EVB G5 through connectors J0101 and J0102.

Step 2: If battery power supply mode is to be used, connect a Li-polymer battery through J0202 and then switch S0201 to **BATTERY**. If 5 V DC power supply mode is to be used, connect 5 V DC power adapter through J0201 and a DC-DC converter and then switch S0201 to **DC POWER**.

Step 3: Switch S0202 to **ON**, and then D0501 will light up.

Step 4: Press S0502 (**PWRKEY**) for at least 2s to turn on the module. When the following interface is displayed on the utilized LCD(s), it means the booting has been completed.

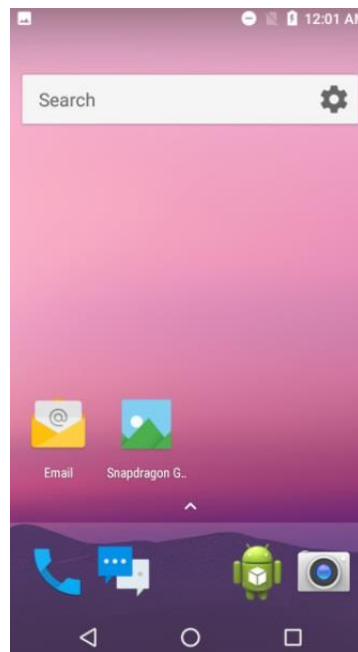


Figure 46: LCD Display Indicating Module’s Turn-on

NOTE

After power supply is provided (i.e., **Step 3** mentioned above), inserting a USB cable into USB interface of EVB can also turn on the module.

5.2. Turn Off the Module

There are two methods to turn off the module.

The steps for the first method are as follows:

Step 1: Press D0501 (**PWRKEY**) for at least 1s under the turn-on state of the module, and then the LCD will display a menu for selection as shown in the following figure:

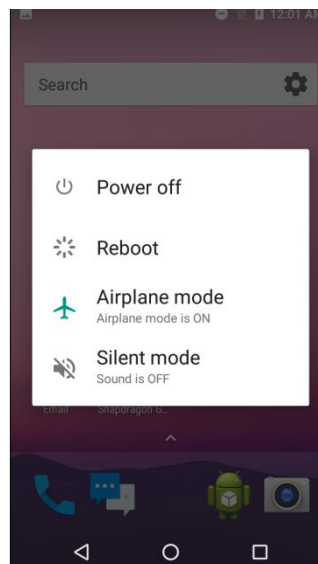


Figure 47: LCD Menu Display for Turning Off Module

Step 2: Choose “**Power off**” option, then the module will be turned off normally.

The other method is to press down **PWRKEY** for at least 8s until the module is shut down completely.

5.3. Communication via USB

Step 1: Turn on the module according to the procedures in **Chapter 5.1**.

Step 2: Connect Smart EVB G5 with PC using USB cable through USB interface and then run the USB flash disk on PC to install the USB driver and ADB driver. The USB port numbers can be viewed in Device Manager of the PC when the USB driver is installed, as shown below.

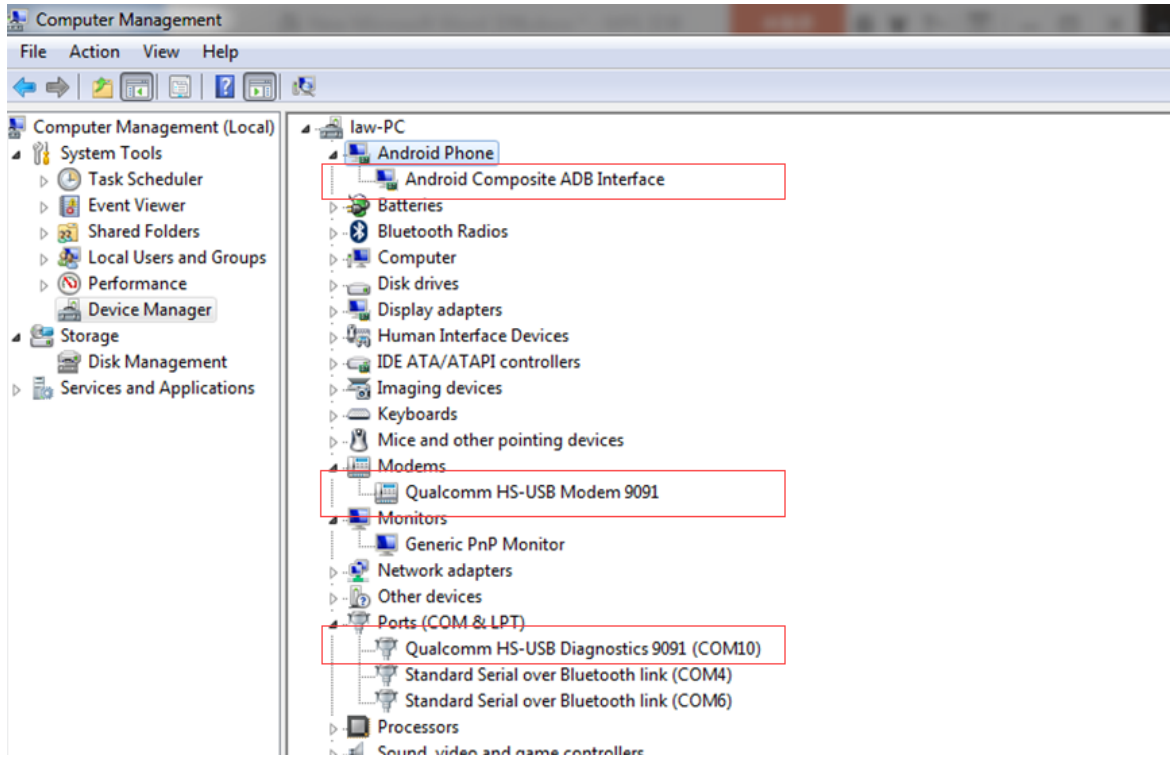


Figure 48: USB Ports

Step 3: Open CMD tool: “**START**” → “**All Programs**” → “**Accessory**” → “**Command Prompt**”.

Step 4: Use the “**adb shell**” command to make the module enter ADB mode. Then customers can use USB ADB interface for testing.

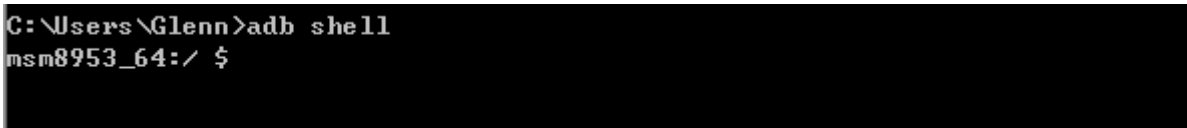


Figure 49: “adb shell” Command

NOTE

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.

5.4. Communication via UART Interface

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

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

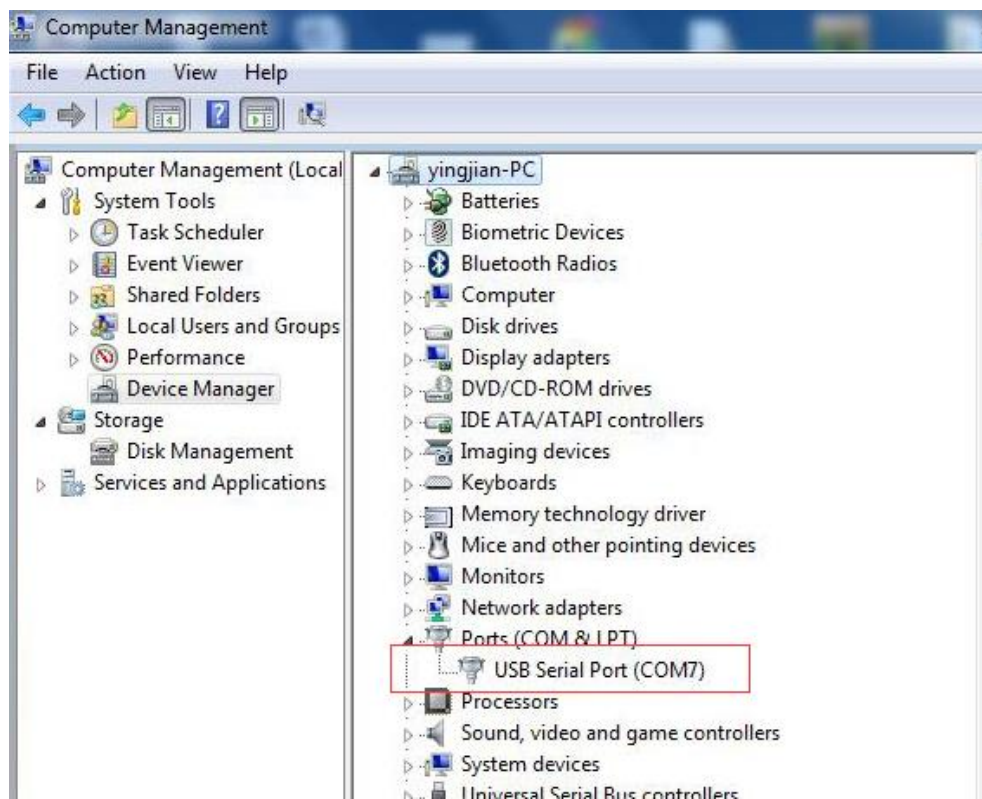


Figure 50: USB Serial Port for UART

Step 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 115200 bps). For more details about QCOM tool usage and configuration, refer to **document [3]**.

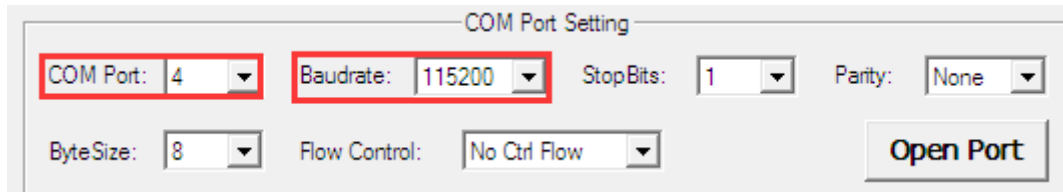


Figure 51: QCOM Configuration When Connecting USB Serial Port

5.5. Firmware Upgrade

Firmware of the module is upgraded via USB port by default. Please refer to the following procedures to upgrade firmware through the EVB.

Step 1: Install and open the firmware upgrade tool QFIL on PC and then turn on the smart module according to the procedures mentioned in **Chapter 5.1**.

Step 2: Click the “**SelectPort**” and select the USB port “**Qualcomm HS-USB Diagnostics Modem 9091 (COM24)**”.

Step 3: Select “**Flat Build**” in “**Select Build Type**” option.

Step 4: Click “**Browse**” in “**Select Programmer**” option to select the firmware which needs to be upgraded.

Step 5: Click “**Load XML**” in “**Select Build**” option to select the XML which needs to be upgraded.

Step 6: Click “**Download**” to upgrade the firmware.

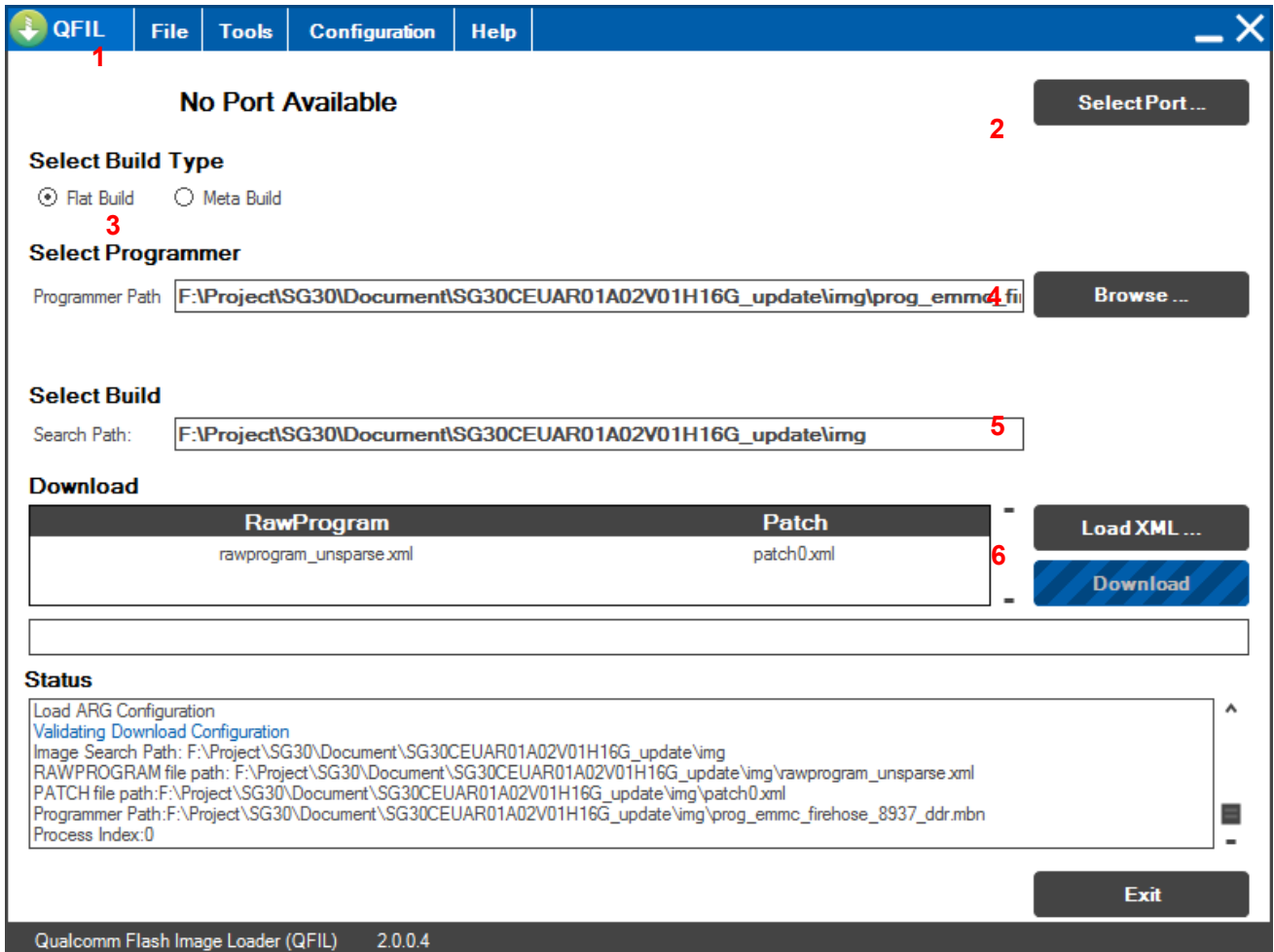


Figure 52: Firmware Upgrade Steps

6 Appendix References

Table 30: Related Documents

Document name
[1] Quectel_SC200L_Series_Hardware_Design
[2] Quectel_SC200E_Series_Reference_Design
[3] Quectel_QCOM_User_Guide

Table 31: Terms and Abbreviations

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