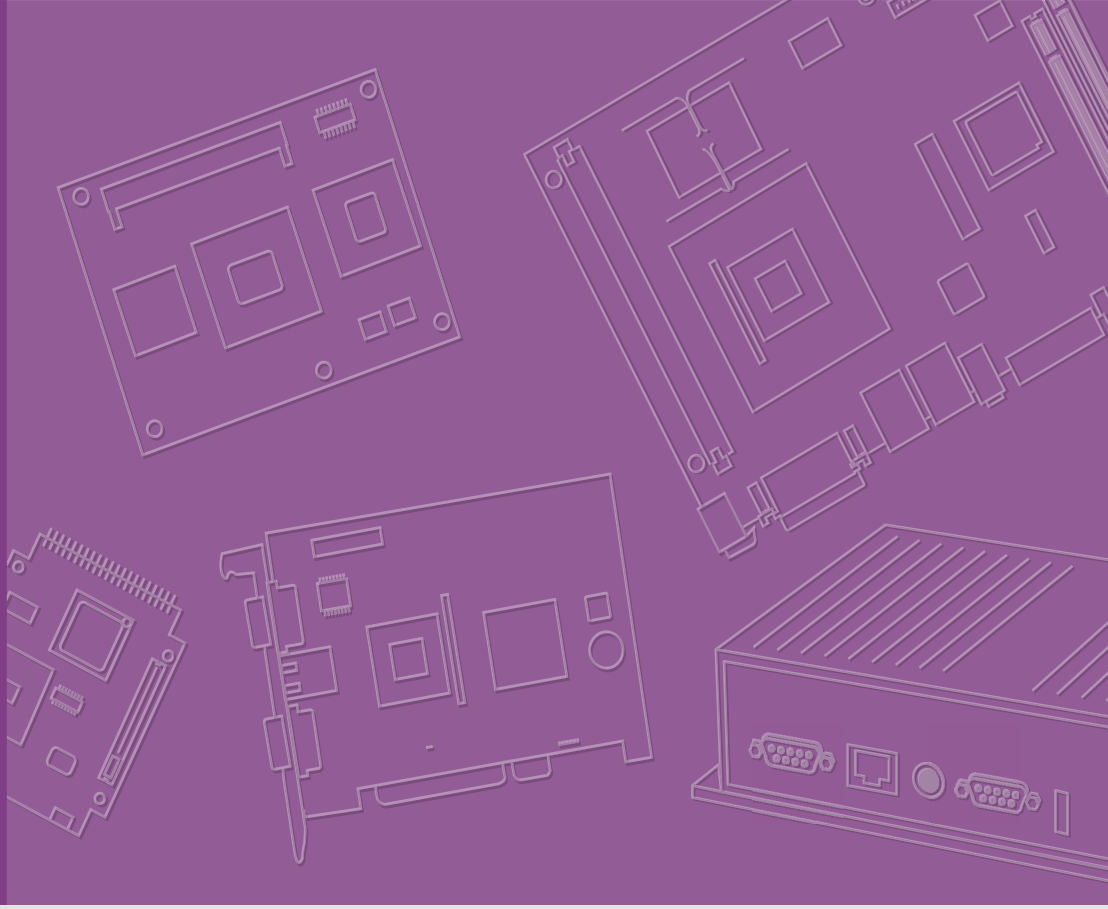

User Manual

MIO-5355

Qualcomm Dragonwing™ QCS6490/ QCS5430 on 3.5" SBC

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For technical support and service, please visit our support website at:
https://www.advantech.com/en/support

This manual is for the MIO-5355.

Part No. 2006535500 Edition 1

November 2025

Product Warranty (2 Years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution! *There is danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x MIO-5355 SBC
- 1 x Heatsink (Pre-installed on SBC) (P/N: 1970006216T001)

Optional Accessories

Dual USB 3.0 Cable 35 cm	(P/N: 1700032181-01)
COM1/COM2 Cable 20cm	(P/N: 1700030404-01)
COM3/COM4 Cable 20 cm	(P/N: 1700031582-01)
MIOe-PSE PoE Module Single 30W	(P/N: MIOE-PSE-DPA1)

Contents

Chapter 1

General Information

This chapter gives background information on the MIO-5355.

Sections include:

- Introduction
- Specifications
- Block Diagram

1.1 Introduction

MIO-5355 is a 3.5-inch (146 x 102 mm) single-board computer and is powered by the Qualcomm Dragonwing QCS6490/QCS5430. It can provide low-power and efficient performance with an 8x Kryo 670 CPU ranging from 1.9 to 2.7 GHz, plus an Adreno GPU 643, and an NPU capable of up to 12 TOPs for AI inference. MIO-5355 can also operate under extended temperatures of -20 to 70°C for outdoor applications.

MIO-5355 provides a rugged design with on-board LPDDR5 8533MT/s, up to 8GB, and on-board storage, either UFS or eMMC, up to 128GB. It provides two flexible displays via 1x LVDS (switchable to eDP without a BOM option) and 1x HDMI, along with rich I/Os: 2x GbE (with optional PoE support), 6x USB, 4x COM, 2x MIPI-CSI, 1x 8-bit GPIO, and 1x combo audio jack. Additionally, it includes 3 standalone M.2 slots: M.2 B-Key 2280, M.2 B-Key 3052, and M.2 E-Key 2230 for easy expansion.

MIO-5355 can support various operating systems: Yocto BSP, Windows, and Ubuntu. The Yocto BSP will be bundled as the default OS for the MIO-5355 standard order part number. Windows on Arm with Win11 IoT Enterprise LTSC 2024 and Ubuntu Desktop 24.04 LTS will be available later, and we will update the OS image P/N in the MIO-5355 datasheet for the bundled shipment via T-P/N process.

1.2 Specifications

Table 1.1: Specifications

CPU	SoC	QCS6490	QCS5430
	Clock Speed	1x A78 @ 2.7 GHz, 3x A78 @ 2.4 GHz, 4x A55 @ 1.9 GH	2x A78 @ 2.1 GHz, 4x A55 @ 1.8 GHz
	Number of CPU Cores	8	6
Memory	Technology	LPDDR5 8533MT/s	
	Max. Capacity	Up to 8GB	
Storage	UFS	Up to 128GB	
	eMMC	Up to 128GB	
GPU & AI	GPU	Adreno™ 643	Adreno™ 642L
	Clock Speed	Up to 812 MHz	Up to 315 MHz
	AI DSP	Hexagon™ 770	Hexagon™ 770
	Clock Speed	1.45 GHz	912 MHz
Display I/F	LCD	1 x LVDS, up to 1920x1200, or 1 x eDP1.4 (Selected by Switch Setting)	
	HDMI/DP	1 x HDMI 2.0, up to 4096 x 2160 @ 60Hz	
	Multi Display	2 simultaneous displays by LVDS or eDP + HDMI	
Ethernet	Controller	LAN1/LAN2: RTL8211FS	
	Speed	LAN/LAN2: GbE	
External I/O	Ethernet	2 x RJ-45	
	HDMI	1	
	Audio	1 x Combo Audio Jack	
	USB	2 x USB 3.0 + 2 x USB 2.0	

Table 1.1: Specifications		
Internal I/O	Micro SD	1
	USB	2 x USB 3.0
	Serial Bus	2 x I2C
	COM Port	2 x RS-232/422/485, 2 x RS-232
	MIPI-CSI	2 x 4-Lane MIPI-CSI
	GPIO	8-bit general purpose input output I/O
	Front Panel Control	Power-on, Reset, Power LED
Expansion	M.2 E-Key	1 x E-Key 2230 (PCIe x1, USB2.0)
	M.2 B-Key	1 x B-Key 2280 (PCIe x2) (Note: Only for Storage) 1 x B-Key 3052 (PCIe x1, USB 2.0) w/ Nano-SIM
Power	Supply Voltage	Vin: DC 12V ± 10%; RTC Battery: Lithium 3V/200mAH
	Connector	ATX 2x2pin 90D (*BOM Option to ATX 2x2pin 180D or DC-IN Jack by request)
	Power Management	AT, ATX
Environment	Temperature	Operating: Standard: 0 ~ 60 °C (32 ~ 140 °F) with 0.7m/s airflow; Extend: -20~70 °C (-4~158 °F) with 0.7m/s airflow Storage: -40 ~ 85 °C (-40 ~ 185 °F)
	Humidity	Operating: 40 °C @ 95% relative humidity, non-condensing Storage: 60 °C @ 95% relative humidity, non-condensing
	Vibration Resistance	3.5 Grms
Certification	EMC	CE, FCC Class B, ESD 8KV/15KV Criteria A
Mechanical	Dimensions	146 x 102 mm (5.7" x 4")
	Net Weight	128g (without Heatsink)

*For the most updated product specification, please refer to the MIO-5355 product datasheet on Advantech website:

https://www.advantech.com/en/

1.3 Block Diagram

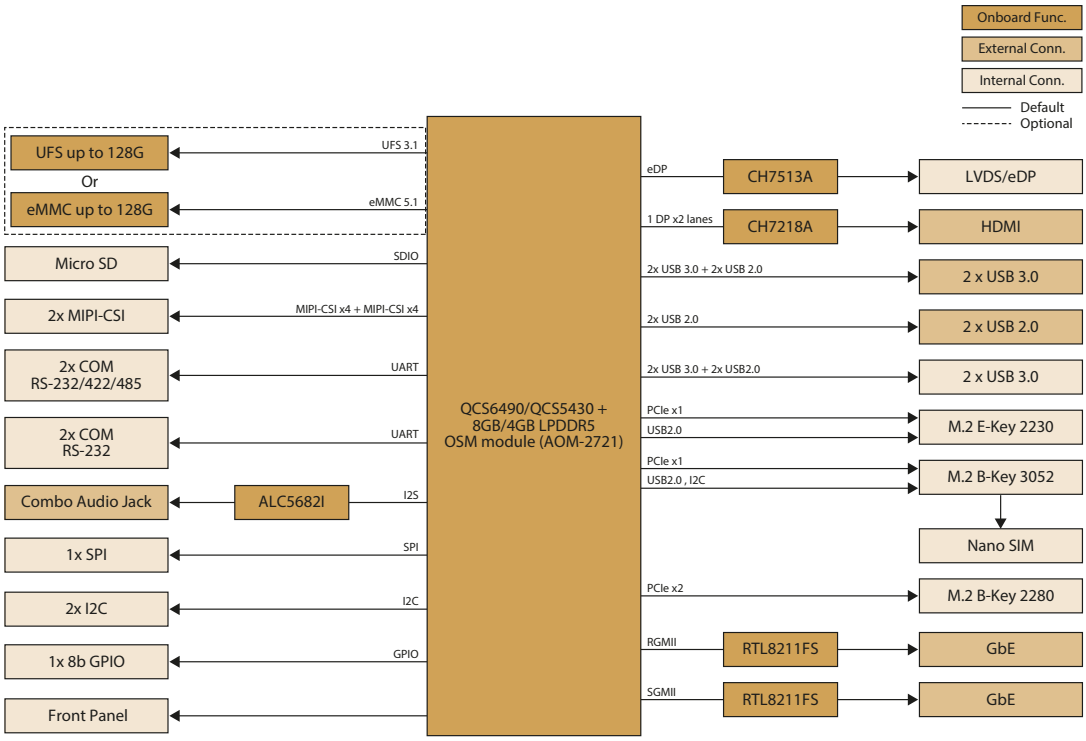


Figure 1.1 Block Diagram

Chapter 2

Mechanical

This chapter gives mechanical information for the MIO-5355. Sections include:

- Mechanical Drawings

2.1 Board Layout: Dimensions

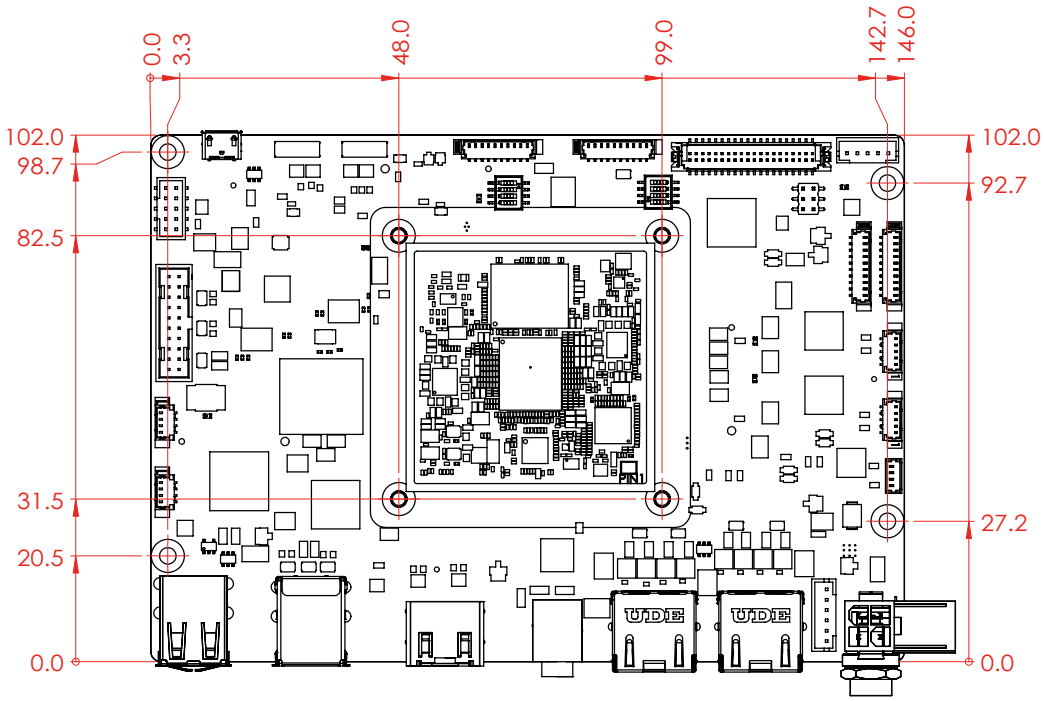


Figure 2.1 Mechanical Drawing (Top Side)

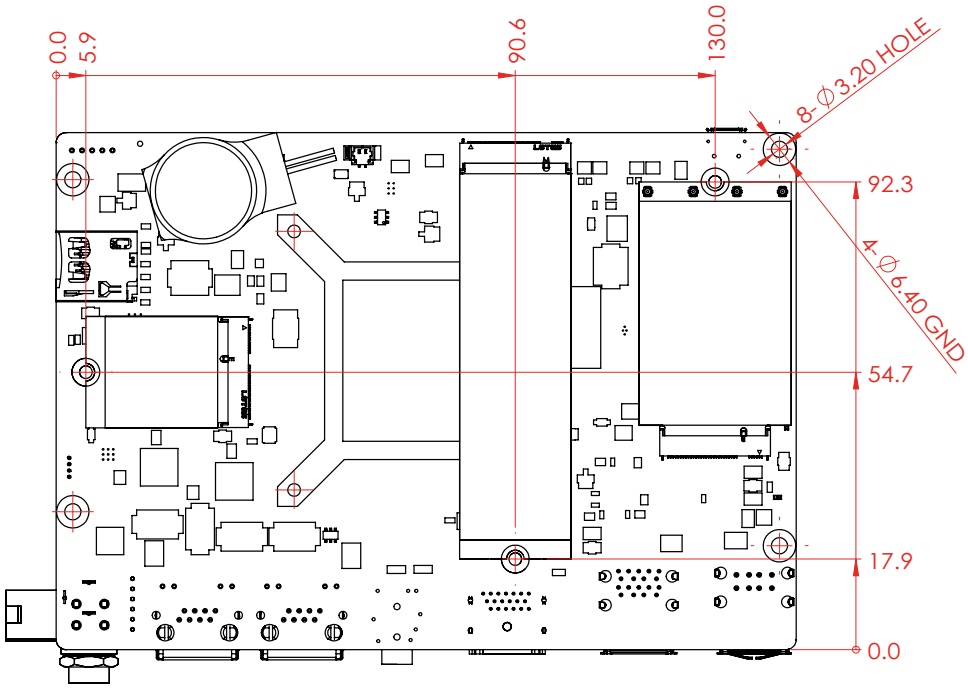


Figure 2.2 Mechanical Drawing (Bottom Side)

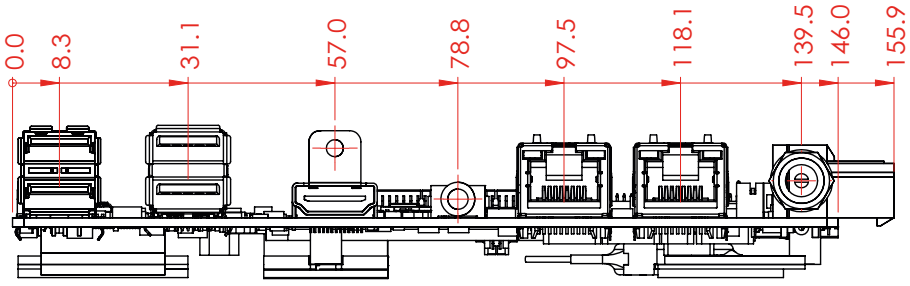


Figure 2.3 Mechanical Drawing (Coastline)

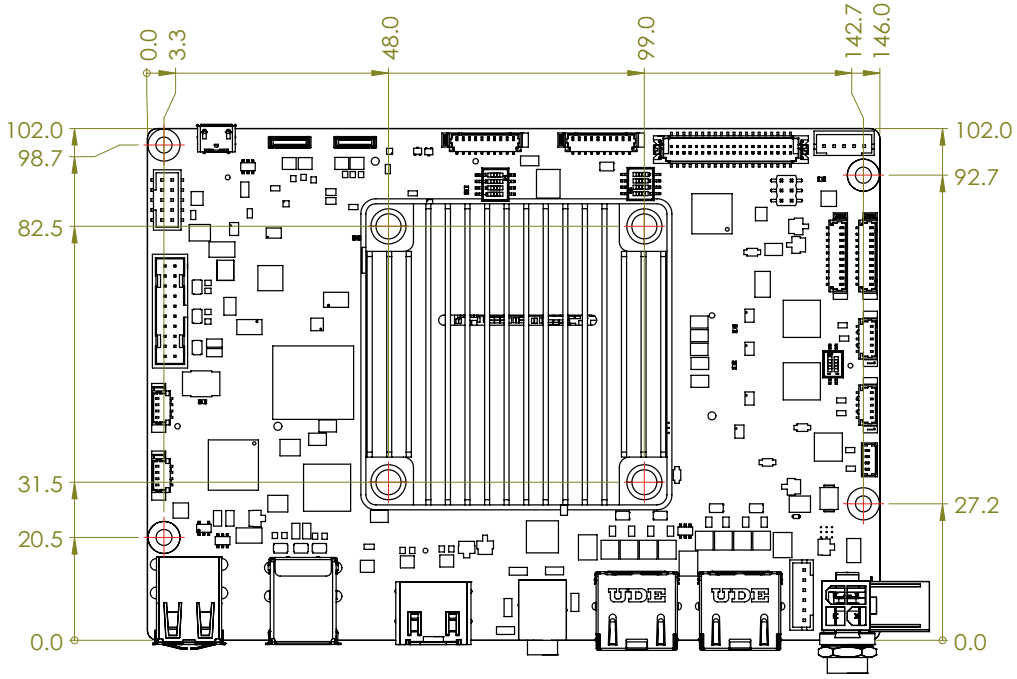


Figure 2.4 Mechanical Drawing with Heatsink (Top Side)

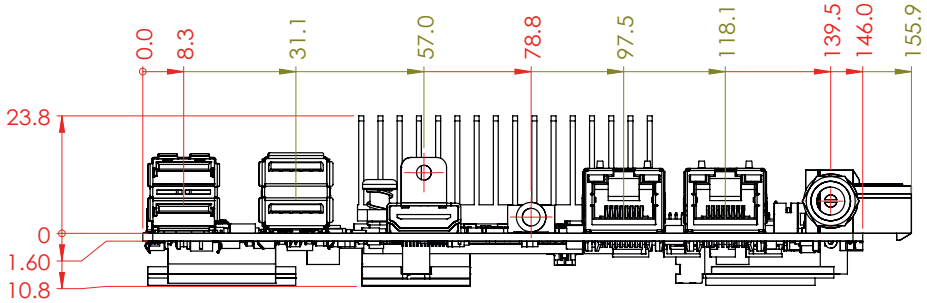


Figure 2.5 Mechanical Drawing with Heatsink (Coastline)

Chapter 3

Installation

This chapter explains the setup procedures of the MIO-5355 hardware, including instructions on setting jumpers and connecting peripherals, switches, and indicators. Be sure to read all safety precautions before you begin the installation procedure.

3.1 Switch and Jumper List

Table 3.1: Switch and Jumper List		
No	**Description**	**Location Name**
1	Multifunction Switch	SW1
2	LVDS/eDP Switch	SW2
3	Panel Voltage Selection	VDD1
4	COM RX TERM	SW3

3.2 Connector and Header List

Table 3.2: Connector and Header List		
No	**Description**	**Location Name**
1	DC input Connector (Default: 90d)	DCIN1
2	DC input Connector (Option: 180d)	DCIN2
3	DC input Connector (Option: DC-IN Jack)	DCIN3
4	I2C Connector	I2C_2
5	I2C Connector	I2C_1
6	Internal USB3.1 Gen1 Connector	USB1
7	SPI Connector	SPI1
8	USB2.0 (Debug only)	USB_EDL1
9	MIPI CSI	CAM1
10	MIPI CSI	CAM2
11	Power/LED	FP1
12	GPIO Connector	GPIO1
13	LVDS Connector	LVDS1
14	Inverter Connector	BL1
15	COM port Connector (RS232+RS422+RS485)	COM1
16	COM port Connector (RS232+RS422+RS485)	COM2
17	COM port Connector (RS232 only)	COM3
18	COM port Connector (RS232 only)	COM4
19	COM port Connector (RS232 only)	COME_DEBUG1
20	M.2 Key B (PCIe x1 / USB2.0)	M2_B1
21	M.2 Key M (PCIe x2)	M2_M1
22	M.2 Key E (PCIe x1 / USB2.0)	M2_E1
23	RTC Battery Connector	BAT1

3.3 Connector Locations

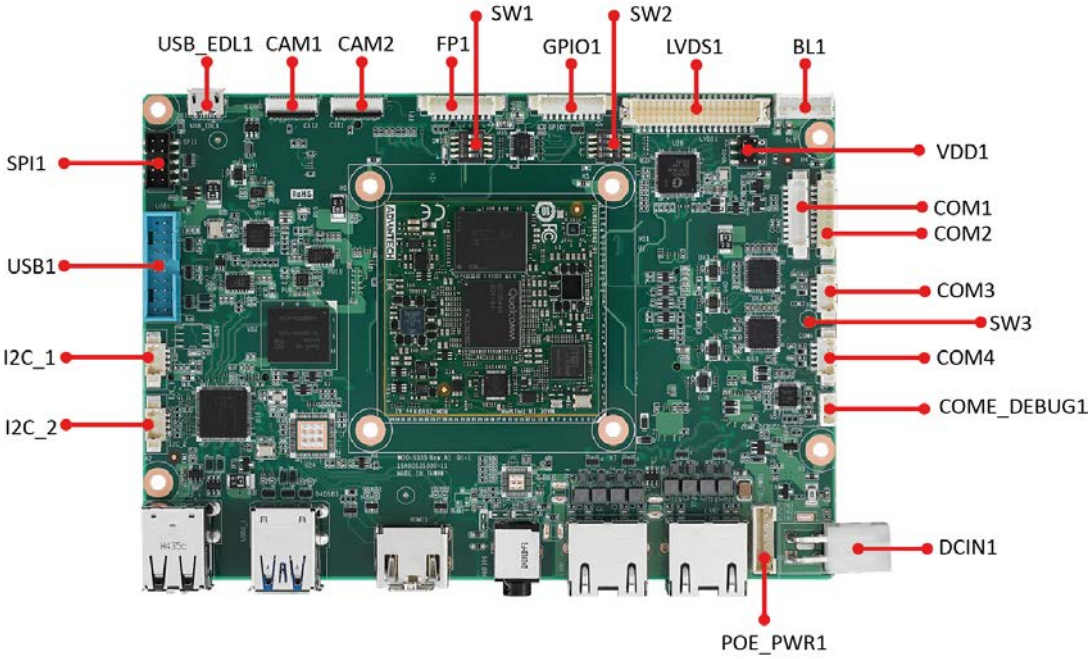


Figure 3.1 MIO-5355 Connector Locations (Top Side)

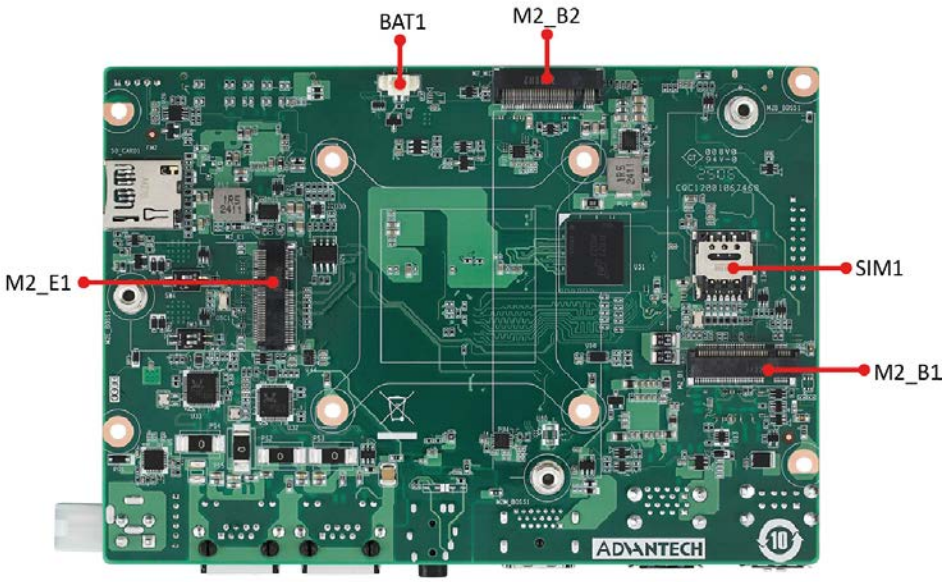
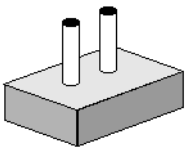


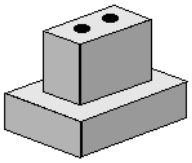
Figure 3.2 MIO-5355 Connector Locations (Bottom Side)

3.4 Setting Jumpers

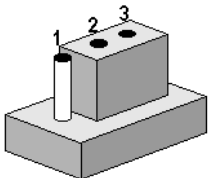
Configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper, you connect the pins with the clip. To “open” a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2, or 2 and 3. The jumper settings are schematically depicted in this manual as follows:



open



closed

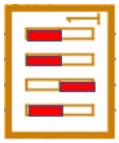
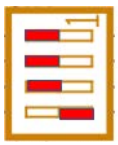


closed 2-3

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

3.4.1 Multifunction Switch / SW1

Table 3.3: Multifunction Switch / SW1

Function	Switch Settings	
USB EDL Mode		
	*NORMAL Mode	USB EDL Mode
AT/ATX Selection		
	ATX Mode*	AT Mode
Boot Device		
	eMMC	UFS
EDP/LVDS Function		
	EDP	*LVDS

*Default Setting

Note: Boot device: UFS or eMMC will follow the ordering part number.

3.4.2 LVDS Switch / SW2

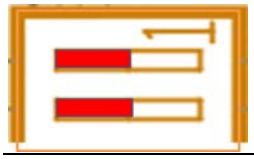
Table 3.4: LVDS Switch / SW2

Function	Switch Setting
LVDS EDID	▸ LVDS EDID:

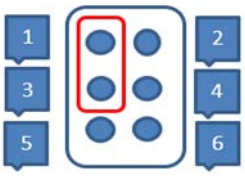
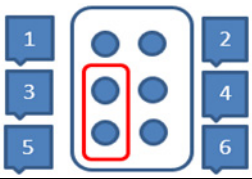
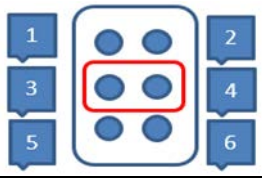
	HA	VA	MHz	CH	6/8 bit
0: SW6 (1-on, 2-on, 3-on, 4-on)	800	480	33.25	Single	8 bit
1: SW6 (1-off, 2-on, 3-on, 4-on)	1024	768	65	Single	6 bit
2: SW6 (1-on, 2-off, 3-on, 4-on)	1024	768	65	Single	8 bit
3: SW6 (1-off, 2-off, 3-on, 4-on)	1280	768	79.5	Single	6 bit
4: SW6 (1-on, 2-on, 3-off, 4-on)	1280	800	83.5	Single	6 bit
5: SW6 (1-off, 2-on, 3-off, 4-off)	1280	960	108	Single	6 bit
6: SW6 (1-on, 2-off, 3-off, 4-on)	1280	1024	108	Dual	8 bit
7: SW6 (1-off, 2-off, 3-off, 4-on)	1366	768	85.5	Single	6 bit
8: SW6 (1-on, 2-on, 3-on, 4-off)	1366	768	85.5	Single	8 bit
9: SW6 (1-off, 2-on, 3-on, 4-off)	1440	900	106.5	Dual	8 bit
10: SW6 (1-on, 2-off, 3-on, 4-off)	1400	1050	121.75	Dual	8 bit
11: SW6 (1-off, 2-off, 3-on, 4-off)	1600	900	119	Dual	8 bit
12: SW6 (1-on, 2-on, 4-off, 4-off)	1680	1050	146.25	Dual	8 bit
13: SW6 (1-off, 2-on, 3-off, 4-off)	1600	1200	162	Dual	8 bit
14: SW6 (1-on, 2-off, 3-off, 4-off)	1920	1080	148.5	Dual	8 bit
15: SW6 (1-off, 2-off, 3-off, 4-off)	1920	1200	154	Dual	8 bit

3.4.3 COM RX TERM / SW3

Table 3.5: COM RX TERM / SW3

Function	Switch Settings	
COM1 TERM RX Enable		
	Disable	Enable
COM2 TERM RX Enable		
	Disable	Enable

3.4.4 Panel Voltage Selection / VDD1

Table 3.6: Panel Voltage Selection / VDD1	
Function	**Jumper Setting**
Panel Voltage Setting: +V3.3 (Default)	
Panel Voltage Setting: +V5	
Panel Voltage Setting: +V12	

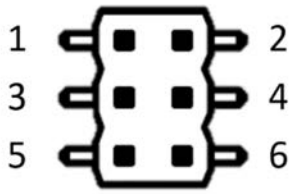


Table 3.7: Panel Voltage Selection (VDD1)	
Pin	**Signal Pin Definition**
1	+V3.3
2	NC
3	+V_LVDS_LCD
4	+V12
5	+V5
6	NC

3.4.5 DC input Connector (Default: 90d) / DCIN1

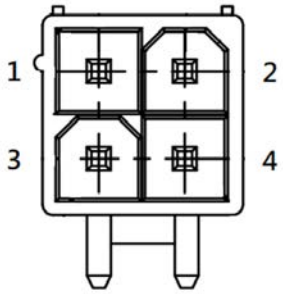


Table 3.8: DC input Connector (Default: 90d) / DCIN1	
Pin	**Signal Pin Definition**
1	GND
2	GND
3	+V12_DC_IN
4	+V12_DC_IN

3.4.6 I2C Connector / I2C_1 & I2C_2

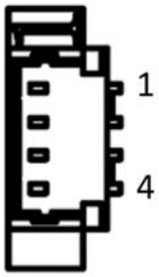


Table 3.9: I2C Connector / I2C_1 & I2C_2	
Pin	**Signal Pin Definition**
1	GND
2	I2C_SDA
3	I2C_SCL
4	3.3V

3.4.7 Internal USB3.1 Gen1 Connector / USB1

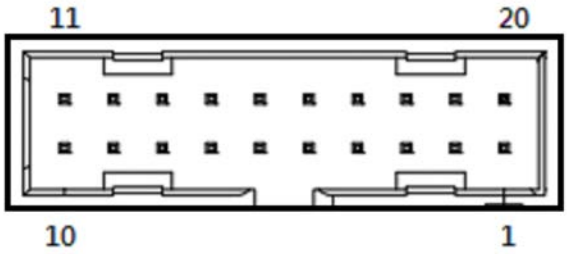


Table 3.10: Internal USB3.1 Gen1 Connector / USB1

Pin	Signal Pin Definition
1	Vbus
2	IntA_P1_SSRX-
3	IntA_P1_SSRX+
4	GND
5	IntA_P1_SSTX-
6	IntA_P1_SSTX+
7	GND
8	IntA_P1_D-
9	IntA_P1_D+
10	NC
11	IntA_P2_D+
12	IntA_P2_D-
13	GND
14	IntA_P2_SSTX+
15	IntA_P2_SSTX-
16	GND
17	IntA_P2_SSRX+
18	IntA_P2_SSRX-
19	Vbus
20	No Pin

3.4.8 SPI Connector / SPI1

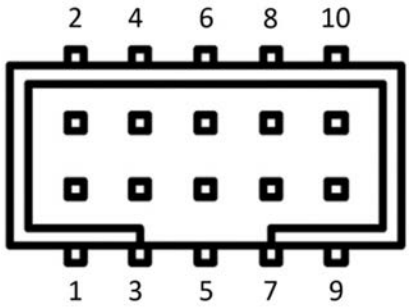


Table 3.11: SPI Connector / SPI1	
Pin	**Signal Pin Definition**
1	1.8V
2	GND
3	SPI_CS0
4	SPI_SCK
5	SPI_SDO
6	SPI_SDI
7	NC
8	SPI_CS1
9	NC
10	NC

3.4.9 USB2.0 (Debug only) / USB_EDL1

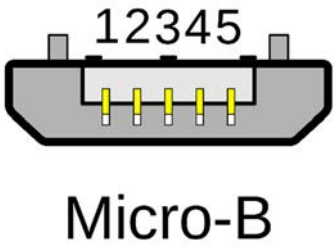


Table 3.12: USB2.0 (Debug only) / USB_EDL1	
Pin	**Signal Pin Definition**
1	5V(from device)
2	USB_A_D_N
3	USB_A_D_P
4	GND
5	GND

3.4.10 MIPI CSI / CAM1 & CAM2

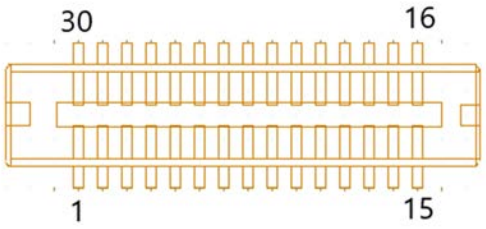


Table 3.13: MIPI CSI / CAM1 & CAM2

Pin	Signal Pin Definition
1	CAM1_STROBE
2	NC
3	2.8V
4	NC
5	CAM1_RESET
6	GND
7	CSI1_D2+
8	CSI1_D2-
9	GND
10	CSI1_D0+
11	CSI1_D0-
12	GND
13	CSI1_D3+
14	CSI1_D3-
15	CAM_PWR_SWITCH
16	GND
17	CSI1_D1-
18	CSI1_D1+
19	GND
20	CSI1_CK-
21	CSI1_CK+
22	GND
23	CAM1_MCLK
24	GND
25	I2C_CAM1_SCL
26	I2C_CAM1_SDA
27	CAM1_PWDN
28	1.8V
29	NC
30	1.2V

Pin	Signal Pin Definition
1	CAM_STROBE
2	NC
3	2.8V
4	NC

Table 3.13: MIPI CSI / CAM1 & CAM2	
5	CAM_RESET
6	GND
7	CSI_D2+
8	CSI_D2-
9	GND
10	CSI_D0+
11	CSI_D0-
12	GND
13	CSI_D3+
14	CSI_D3-
15	CAM_PWR_SWITCH
16	GND
17	CSI1_D1-
18	CSI1_D1+
19	GND
20	CSI1_CK-
21	CSI1_CK+
22	GND
23	CAM_MCLK
24	GND
25	I2C_CAM_SCL
26	I2C_CAM_SDA
27	CAM_PWDN
28	1.8V
29	NC
30	1.2V

3.4.11 Power & LED / FP1

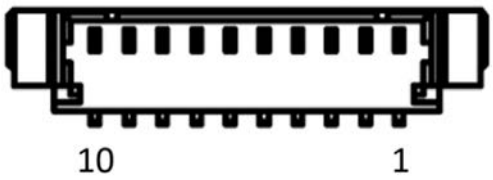


Table 3.14: Power & LED / FP1	
Pin	**Signal Pin Definition**
1	GND
2	NC
3	NC
4	NC
5	NC
6	FP_A_PSIN#
7	FP_A_RST#
8	220 ohm PU to +V3.3
9	NC
10	330 ohm PU to +V5

3.4.12 GPIO Connector / GPIO1

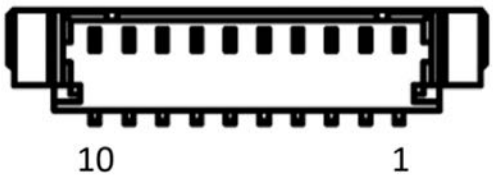


Table 3.15: GPIO Connector / GPIO1

Pin	Signal Pin Definition
1	GND
2	EC_P1_GPIO7
3	EC_P1_GPIO2
4	EC_P1_GPIO6
5	EC_P1_GPIO1
6	EC_P1_GPIO5
7	EC_P1_GPIO0
8	EC_P1_GPIO4
9	+V5A_GPIO
10	EC_P1_GPIO3

3.4.13 LVDS Connector / LVDS1

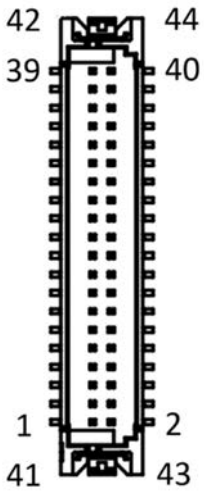


Table 3.16: LVDS Connector / LVDS1

Pin	Signal Pin Definition
1	+V_LCD
2	+V_LCD
3	GND
4	GND
5	+V_LCD
6	+V_LCD
7	LVDS1_0_D0-
8	LVDS1_1_D0-

Table 3.16: LVDS Connector / LVDS1	
9	LVDS1_0_D0+
10	LVDS1_1_D0+
11	GND
12	GND
13	LVDS1_0_D1-
14	LVDS1_1_D1-
15	LVDS1_0_D1+
16	LVDS1_1_D1+
17	GND
18	GND
19	LVDS1_0_D2-
20	LVDS1_1_D2-
21	LVDS1_0_D2+
22	LVDS1_1_D2+
23	GND
24	GND
25	LVDS1_0_CLK-
26	LVDS1_1_CLK-
27	LVDS1_0_CLK+
28	LVDS1_1_CLK+
29	GND
30	GND
31	LVDS0_DDCCLK_AUX+
32	LVDS0_DDCDAT_AUX-
33	GND
34	GND
35	LVDS1_0_D3-
36	LVDS1_1_D3-
37	LVDS1_0_D3+
38	LVDS1_1_D3+
39	NC
40	LVDS1_VCON

3.4.14 Panel Inverter Connector / BL1

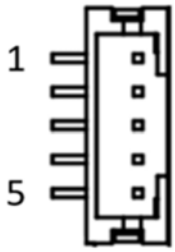


Table 3.17: Panel Inverter Connector / BL1	
Pin	**Signal Pin Definition**
1	+V12_1_INVERTER_0
2	GND
3	LVDS1_Z_ENABKL
4	EC_LVDS1_Z_PWM
5	+V5_1_INVERTER_0

3.4.15 COM Port Connector (RS232+RS422+RS485) / COM1

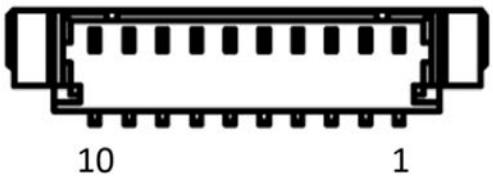


Table 3.18: COM Port Connector (RS232+RS422+RS485) / COM1	
Pin	**Signal Pin Definition**
1	NC
2	NC
3	COMA_485RX-
4	COMA_CTS#
5	COMA_TXD_485RX+
6	COMA_RTS#
7	COMA_RXD_485TX+
8	NC
9	COMA_485TX-
10	GND

3.4.16 COM Port Connector (RS232+RS422+RS485) / COM2

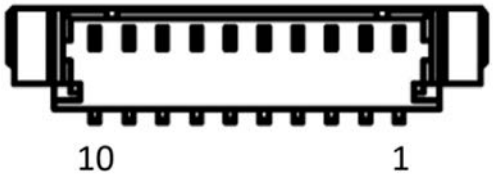


Table 3.19: COM Port Connector (RS232+RS422+RS485) / COM2	
Pin	**Signal Pin Definition**
1	NC
2	NC
3	COMB_485RX-
4	COMB_CTS#
5	COMB_TXD_485RX+
6	COMB_RTS#
7	COMB_RXD_485TX+
8	NC
9	COMB_485TX-
10	GND

3.4.17 COM Port Connector (RS232) / COM3

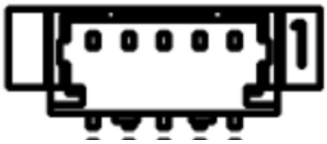


Table 3.20: COM Port Connector (RS232) / COM3	
Pin	**Signal Pin Definition**
1	COMC_TXD
2	NC
3	COMC_RXD
4	NC
5	GND

3.4.18 COM Port Connector (RS232) / COM4

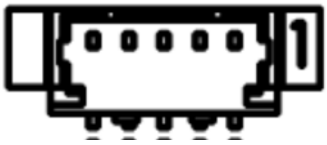


Table 3.21: COM Port Connector (RS232) / COM4	
Pin	**Signal Pin Definition**
1	COMD_TXD
2	NC
3	COMD_RXD
4	NC
5	GND

3.4.19 COM Port Connector (RS232 only) / COME_DEBUG1

Table 3.22: COM Port Connector (RS232 only) / COME_DEBUG1	
Pin	**Signal Pin Definition**
1	3.3V
2	COME_TXD
3	COME_RXD
4	GND

3.4.20 M.2 Key B (PCIe x1 / USB2.0) / M2_B1

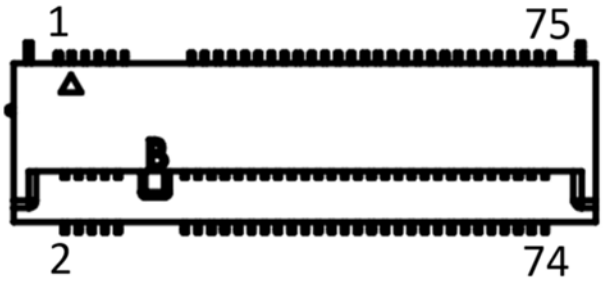


Table 3.23: M.2 Key B (PCIe x1 / USB2.0) / M2_B1			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
74	3.3V	75	NC
72	3.3V	73	GND
70	3.3V	71	GND
68	NC	69	NC
66	NC	67	RESET# (1.8V)
64	NC	65	NC
62	NC	63	NC
60	NC	61	NC
58	NC	59	ANTCTL0
56	NC	57	GND
54	PEWAKE# (3.3V)	55	REFCLKp
52	CLKREQ# (3.3V)	53	REFCLKn
50	PERST# (3.3V)	51	GND
48	NC	49	PERp0
46	NC	47	PERn0
44	ALERT# (1.8V)	45	GND
42	NC	43	PETp0
40	NC	41	PETn0

Table 3.23: M.2 Key B (PCIe x1 / USB2.0) / M2_B1			
38	NC	39	GND
36	UIM_PWR	37	NC
34	UIM_DATA	35	NC
32	UIM_CLK	33	GND
30	UIM_RESET	31	NC
28	NC	29	NC
26	W_DISABLE2# (3.3V)	27	GND
24	NC	25	DPR
22	NC	23	NC
20	NC	21	NC
29	NC	29	NC
30	M2B1_SATA_DEVSLP_R	30	M2B1_SATA_DEVSLP_R
31	GND	31	GND
32	NC	32	NC
10	LED_1# (3.3V)	11	GND
8	W_DISABLE1# (3.3V)	9	USB_D-
6	FULL_CARD_POW-ER_OFF# (1.8V)	7	USB_D+
4	3.3V	5	GND
2	3.3V	3	GND
		1	NC

3.4.21 M.2 Key M (PCIe x2) / M2_M1

Table 3.24: M.2 Key M (PCIe x2) / M2_M1			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
74	3.3V	75	GND
72	3.3V	73	GND
70	3.3V	71	GND
68	NC	69	NC
66	NC	67	NC
64	NC	65	NC
62	NC	63	NC
60	NC	61	NC
58	NC	59	NC
56	NC	57	GND
54	PEWAKE# (3.3V)	55	REFCLKp
52	CLKREQ# (3.3V)	53	REFCLKn

Table 3.24: M.2 Key M (PCIe x2) / M2_M1			
50	PERST# (3.3V)	51	GND
48	NC	49	PERp0
46	NC	47	PERn0
44	NC	45	GND
42	NC	43	PETp0
40	NC	41	PETn0
38	NC	39	GND
36	NC	37	PERp1
34	NC	35	PERn1
32	NC	33	GND
30	NC	31	PETp1
28	NC	29	PETn1
26	NC	27	GND
24	NC	25	NC
22	NC	23	NC
20	NC	21	GND
18	3.3V	19	NC
16	3.3V	17	NC
14	3.3V	15	GND
12	3.3V	13	NC
10	LED_1# (3.3V)	11	NC
8	NC	9	GND
6	NC	7	NC
4	3.3V	5	NC
2	3.3V	3	GND
		1	GND

3.4.22 M.2 Key E (PCIe x1 + USB2.0) / M2_E1

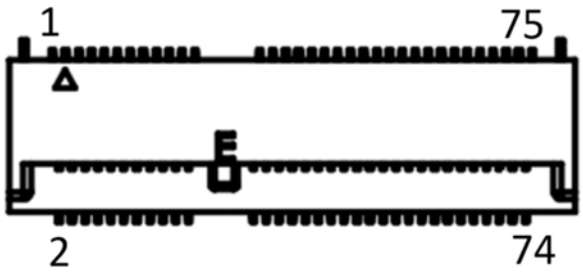


Table 3.25: M.2 Key E (PCIe x1 + USB2.0) / M2_E1			
Pin	**Signal Pin Definition**	**Pin**	**Signal Pin Definition**
74	3.3V	75	GND
72	3.3V	73	NC
70	NC	71	NC
68	NC	69	GND
66	NC	67	NC
64	NC	65	NC
62	ALERT (1.8V)	63	GND

Table 3.25: M.2 Key E (PCIe x1 + USB2.0) / M2_E1			
60	I2C_A_SCL (NL)	61	NC
58	I2C_A_SDA (NL)	59	NC
56	W_DISABLE1# (3.3V)	57	GND
54	W_DISABLE2# (3.3V)	55	PEWAKE0# (3.3V)
52	PERST0# (3.3V)	53	CLKREQ0# (3.3V)
50	SUSCLK (3.3V)	51	GND
48	NFA765_UART_TX (NL)	49	REFCLKn0
46	NFA765_UART_RX (NL)	47	REFCLKp0
44	NC	45	GND
42	BT_DEV_WAKE (NL)	43	PETn0
40	WL_DEV_WAKE (NL)	41	PETp0
38	NC	39	GND
36	NC	37	PERn0
34	NC	35	PERp0
32	NC	33	GND
29	NC	29	NC
30	M2B1_SATA_DEVSLP_R	30	M2B1_SATA_DEVSLP_R
31	GND	31	GND
32	NC	32	NC
22	NC	23	NC
20	WAKE#	21	NC
18	GND	19	NC
16	NC	17	NC
14	NC	15	NC
12	NC	13	NC
10	NC	11	NC
8	NC	9	NC
6	NC	7	GND
4	3.3V	5	USB_D-
2	3.3V	3	USB_D+
		1	GND

3.4.23 RTC Battery Connector / BAT1

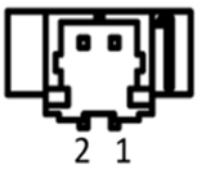


Table 3.26: RTC Battery Connector / BAT1	
Pin	**Signal Pin Definition**
1	+VBAT_b1
2	GND

Chapter 4

Software User Guide (LE)

For the most updated SW User Guide, please refer to below link: https://ess-kms.edgecenter.io/en/aimlinux/public/ECG/MIO-5355_LE_SW_User_Manual

4.1 Hardware Interface Introduction

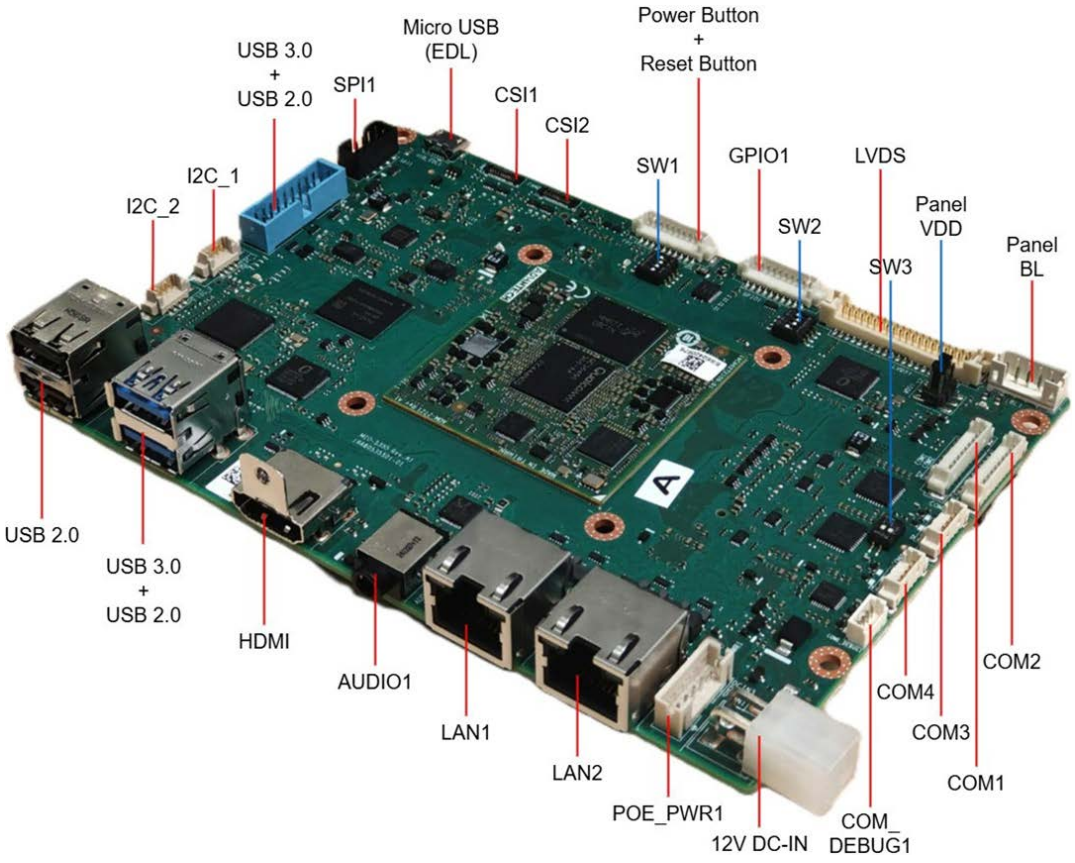


Figure 4.1 Top

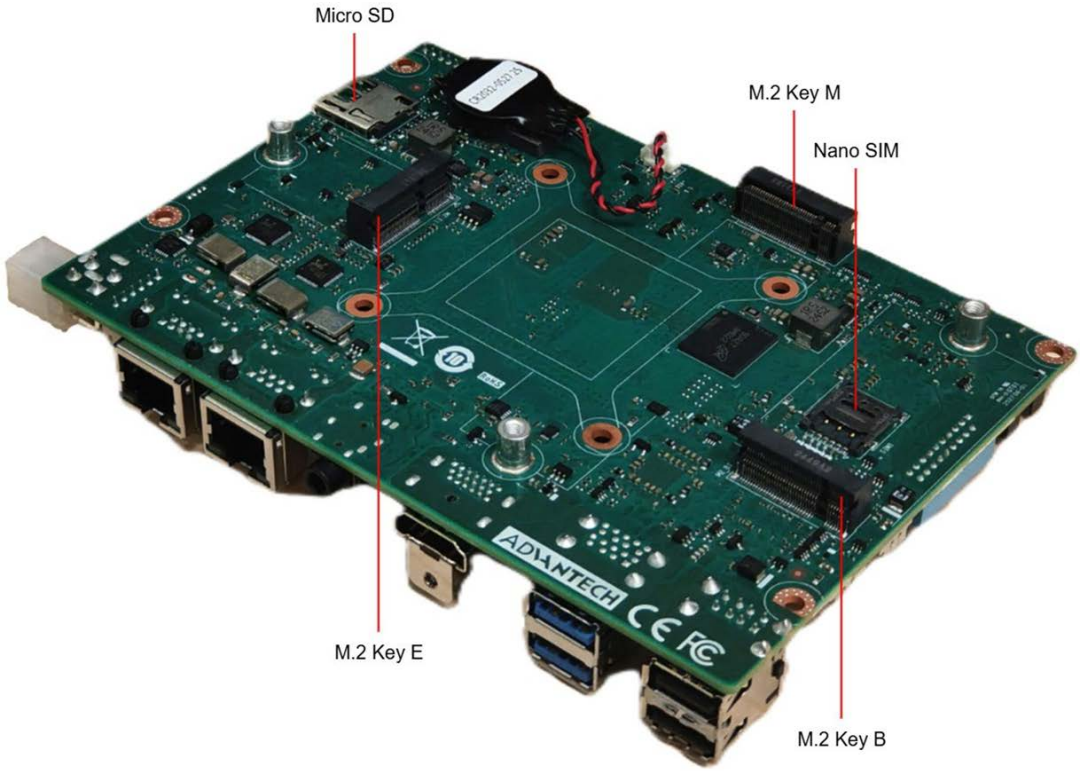


Figure 4.2 Bottom

4.1.1 SW1

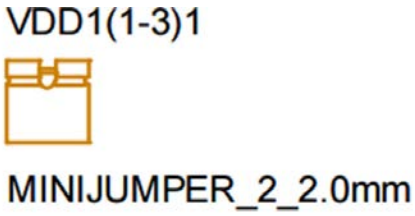
- SW1 (1-on): USB EDL Mode (Forced Recovery)
- SW1 (1-off): Normal Boot
- SW1 (2-on): AT Mode
- SW1 (2-off): ATX Mode
- SW1 (3-on): UFS
- SW1 (3-off): EMMC
- SW1 (4-on): LVDS (DVT Support)
- SW1 (4-off): eDP (DVT Support)

4.1.2 SW2

- LVDS EDID

	HA	VA	MHz	CH	6/8 bit
0: (1-on, 2-on, 3-on, 4-on)	800	480	33.25	Single	8 bit
1: (1-off, 2-on, 3-on, 4-on)	1024	768	65	Single	6 bit
2: (1-on, 2-off, 3-on, 4-on)	1024	768	65	Single	8 bit
3: (1-off, 2-off, 3-on, 4-on)	1280	768	79.5	Single	6 bit
4: (1-on, 2-on, 3-off, 4-on)	1280	800	83.5	Single	6 bit
5: (1-off, 2-on, 3-off, 4-off)	1280	960	108	Single	6 bit
6: (1-on, 2-off, 3-off, 4-on)	1280	1024	108	Dual	8 bit
7: (1-off, 2-off, 3-off, 4-on)	1366	768	85.5	Single	6 bit
8: (1-on, 2-on, 3-on, 4-off)	1366	768	85.5	Single	8 bit
9: (1-off, 2-on, 3-on, 4-off)	1440	900	106.5	Dual	8 bit
10: (1-on, 2-off, 3-on, 4-off)	1400	1050	121.75	Dual	8 bit
11: (1-off, 2-off, 3-on, 4-off)	1600	900	119	Dual	8 bit
12: (1-on, 2-on, 4-off, 4-off)	1680	1050	146.25	Dual	8 bit
13: (1-off, 2-on, 3-off, 4-off)	1600	1200	162	Dual	8 bit
14: (1-on, 2-off, 3-off, 4-off)	1920	1080	148.5	Dual	8 bit
15: (1-off, 2-off, 3-off, 4-off)	1920	1200	154	Dual	8 bit

4.1.3 Panel_VDD



- VDD1 (Select 1,3): 3.3V
- VDD1 (Select 3,5): 5V
- VDD1 (Select 3,4): 12V

4.2 Device Boot

You can use the emmc or ufs boot.

- SW1 (1-off): Normal Boot
- SW1 (2-on): AT Mode
- SW1 (2-off): ATX Mode
- SW1 (3-on): UFS Boot
- SW1 (3-off): EMMC Boot

4.3 UART Debug Console

Follow these steps to connect the device to the host machine through UART.

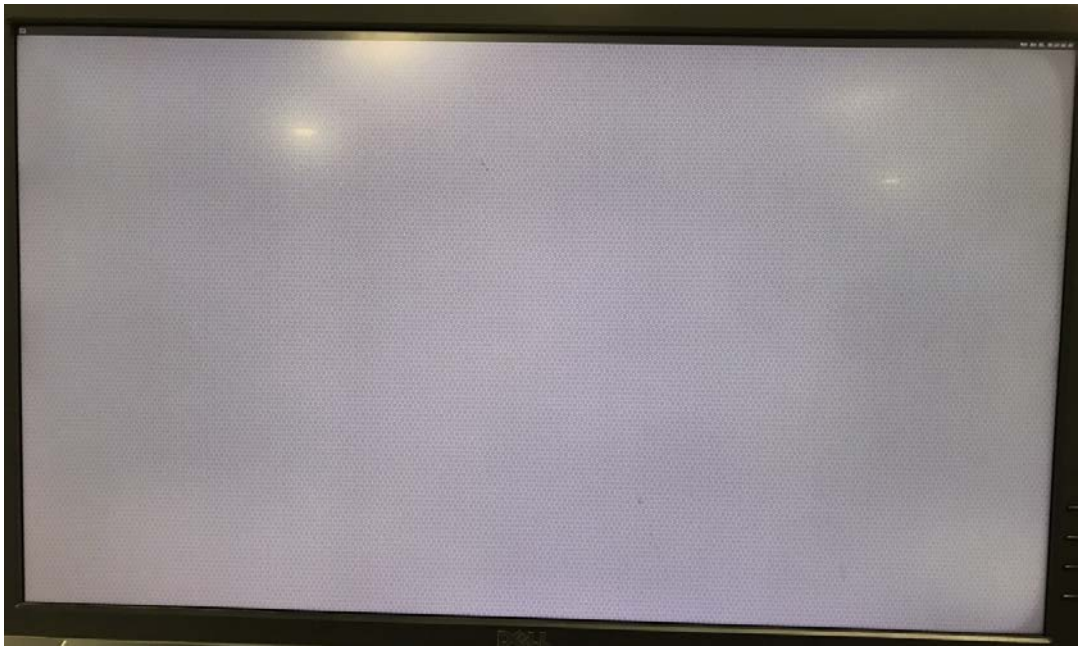
- Connect the debug cable to the "COME_DEBUG1" and connect the device to the host machine
- Connect the 12V power adapter to "12V DC-IN"
- **Push the "Power Button" to power on the device (ATX Mode)**
- Use the serial COM tool, such as PuTTY or Tera Term and set the "Speed" to 115200
- View the serial log dump on your console
- Log in with account and password
  Account: **root**
  Password: **oelinux123**

4.4 Function Test

4.4.1 Display

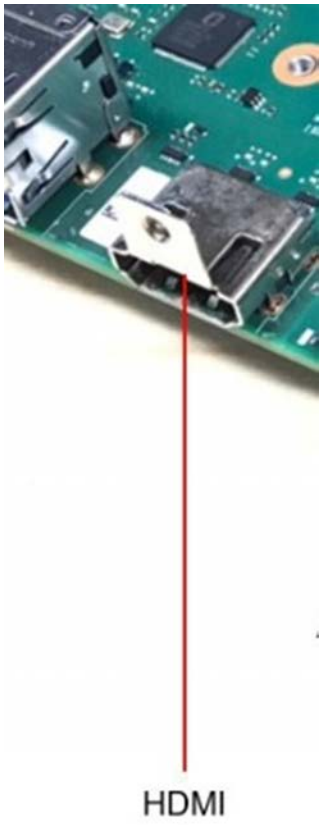
The default display is the LVDS/eDP + HDMI output and the Weston UI will be displayed on the screen.

- Weston UI



4.4.2 HDMI

You can connect the HDMI monitor to following and the Weston UI will be displayed on the screen.



4.4.3 Internal Panel

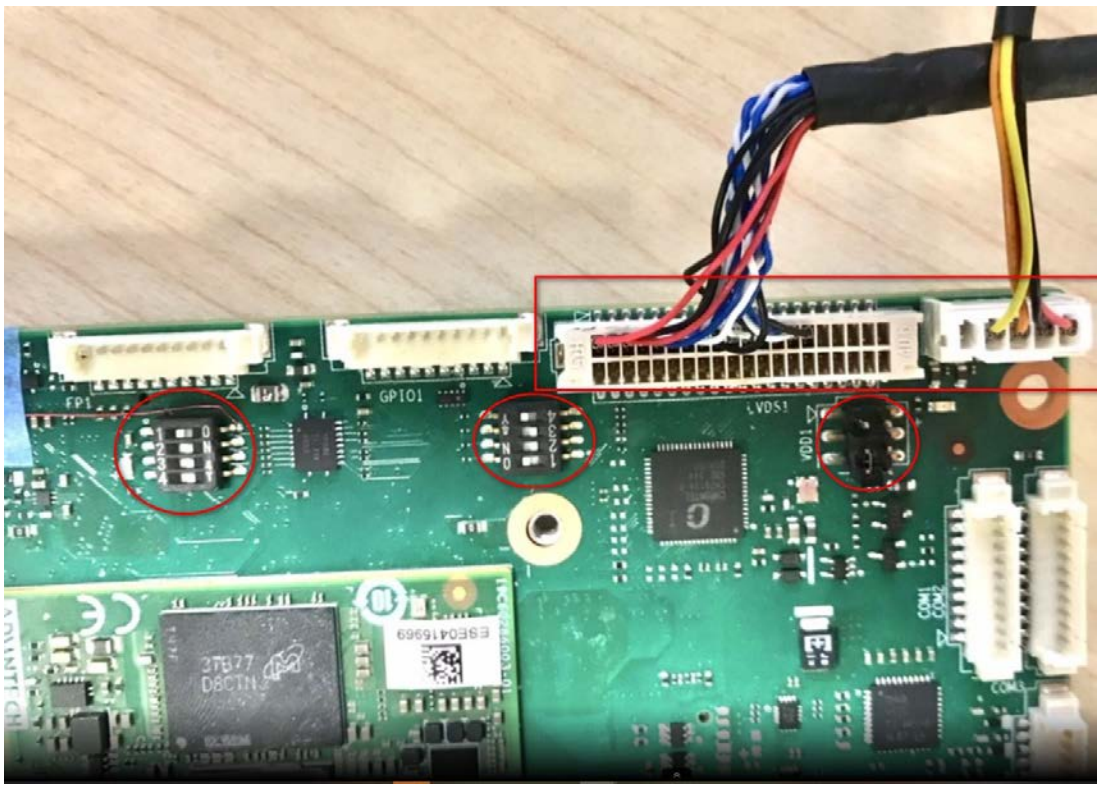
Contains an interface and how to control the backlight.

4.4.4 LVDS

Supports the following LVDS panels:

4.4.5 AUO G190EG01-V0 (LVDS VDD1:5V, Backlight Power:12V)

- SW1 (4-on): LVDS (DVT Support)
- SW2 (1-on, 2-off, 3-off, 4-on)
- LVDS_VDD1 (Select 3,5): 5V
- BL1: 12.V

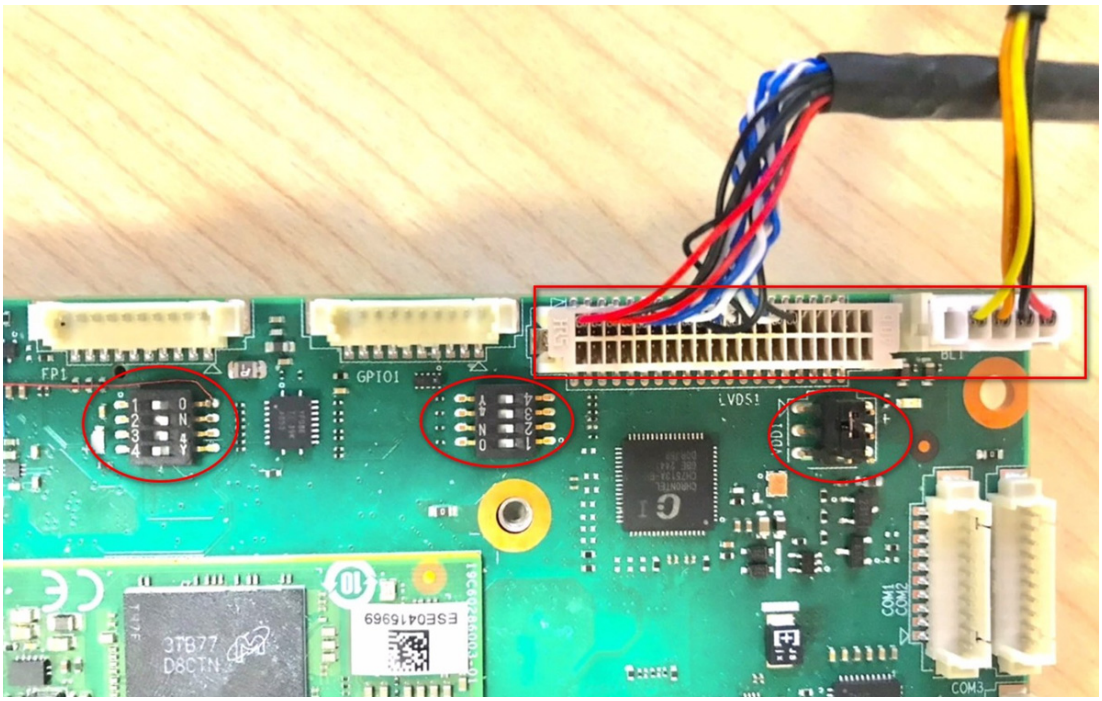


4.4.6 eDP

Supports the following eDP panels:

4.4.7 AUO G156HAN03.0 (LVDS VDD1:3.3V, Backlight Power:12V)

- SW1 (4-off): eDP (DVT Support)
- SW2 (1-off, 2-off, 3-off, 4-off)
- LVDS_VDD1 (Select 1,3): 3.3V
- BL1: 12.V



4.4.8 Panel Backlight

Brightness value (0 ~ 100)

```
1     Get current brightness value:
2     # cat /sys/class/backlight/panel-backlight/brightness
3     Set new brightness value, using 50 as example:
4     # echo 50 > /sys/class/backlight/panel-backlight/bright-
      ness
```

4.4.9 Audio

Connect your headset microphone to the following connector and test it at 44.1 khz and 48 khz to see if it performs as needed.

Line-Out/Speaker test command:

```
1     # source /opt/qcom/qirp-sdk/qirp-setup.sh
2     # gst-launch-1.0 -e filesrc location=/tmp/audio_48k.wav
      ! wavparse ! au
3     or
4     # paplay /tmp/audio_48k.wav
```

Mic-In test command:

```
1     #   pactl set-source-port regular2 speaker-mic
```

```
2     #   tinymix set "Stereo1 ADC L Mux" 0
3     #   tinymix set "STO1 ADC Capture Switch" 1
4     #   tinymix set "RECMIX1L CBJ Switch" 1
5     #   tinymix set "IF1 01 ADC Swap Mux" 2
6     #   tinymix set "CBJ Boost Volume" 3
7     #   tinymixset"Stereo1ADCL1 Mux" 1
8     #   tinymixset"Stereo1ADCR1 Mux" 1
9     #   tinymixset"Stereo1ADCMIXL ADC2Switch"0
10    #   tinymixset"Stereo1ADCMIXR ADC2Switch"0
11    #   tinymixset"Stereo1ADCMIXL ADC1Switch"1
12    #   tinymixset"Stereo1ADCMIXR ADC1Switch"1
13    # source /opt/qcom/qirp-sdk/qirp-setup.sh
14    # gst-launch-1.0 -v pulsesrc volume=5 ! audioconvert !
      wavenc ! filesin 15
16    or
17    # pactl set-source-port regular2 speaker-mic
18    # tinymix set "Stereo1 ADC L Mux" 0
19    # tinymix set "STO1 ADC Capture Switch" 1
20    # tinymix set "RECMIX1L CBJ Switch" 1
21    # tinymix set "IF1 01 ADC Swap Mux" 2
22    # tinymix set "CBJ Boost Volume" 3
23    # tinymix set "Stereo1 ADC L1 Mux" 1
24    # tinymix set "Stereo1 ADC R1 Mux" 1
25    # tinymix set "Stereo1 ADC MIXL ADC2 Switch" 0
26    # tinymix set "Stereo1 ADC MIXR ADC2 Switch" 0
27    # tinymix set "Stereo1 ADC MIXL ADC1 Switch" 1
28    # tinymix set "Stereo1 ADC MIXR ADC1 Switch" 1
      # parec -v --rate=48000 --format=s16le --channels=1 --
      file-format=wav /
```

4.4.10 Storage

- eMMC: /dev/mmcblk0
- SD Card: /dev/mmcblk1
- UFS: /dev/sda, /dev/sdb ...
- SPI Flash: /dev/mtd0, /dev/mtd1

4.4.11 EMMC

```
1     # dd if=/dev/urandom of=data bs=1 count=1024
2     # dd if=/dev/mmcblk1 of=backup bs=1 count=1024 skip=4096
3     # dd if=data of=/dev/mmcblk1 bs=1 seek=4096
4     # dd if=/dev/mmcblk1 of=data1 bs=1 count=1024 skip=4096
      5
5     # diff data data1
6     # dd if=backup of=/dev/mmcblk0 bs=1 seek=4096
```

4.4.12 SD Card

Connect the Micro SD card to the ROM-ED92 SD_CARD1.

```
1      # dd if=/dev/urandom of=data bs=1 count=1024
2      # dd if=/dev/mmcblk1 of=backup bs=1 count=1024 skip=4096
3      # dd if=data of=/dev/mmcblk1 bs=1 seek=4096
4      # dd if=/dev/mmcblk1 of=data1 bs=1 count=1024 skip=4096
5
6      # diff data data1
       # dd if=backup of=/dev/mmcblk1 bs=1 seek=4096
```

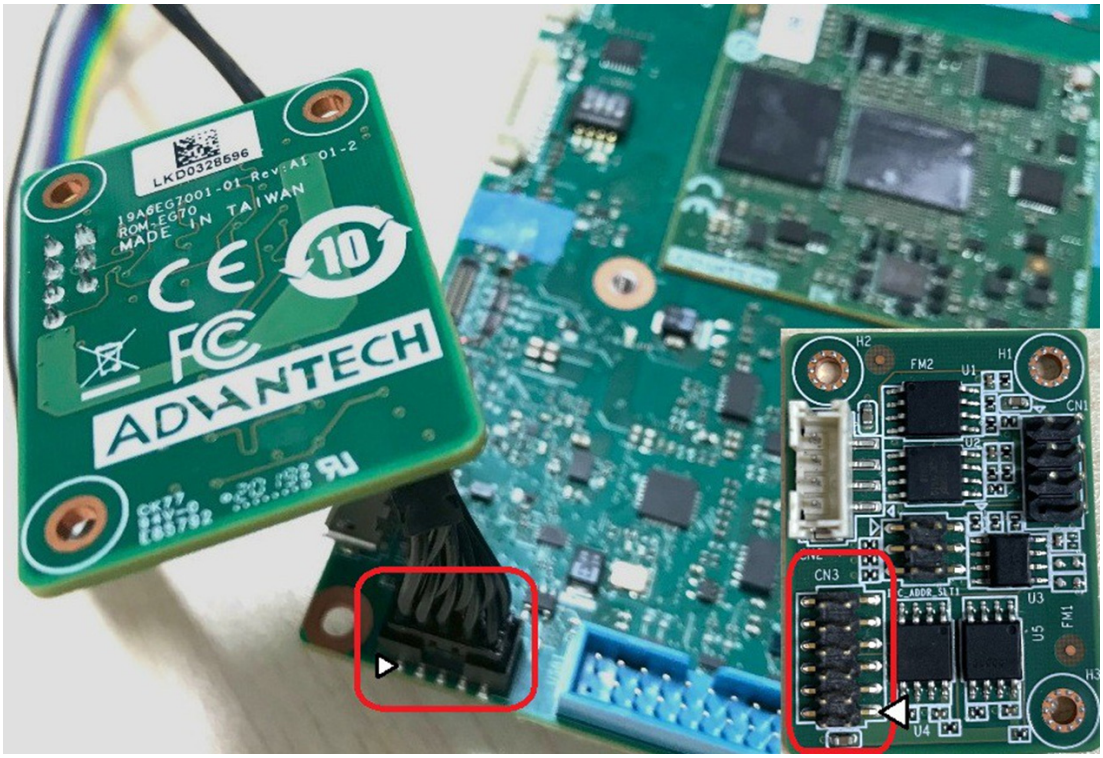
4.4.13 UFS

Need to do the UFS Provision, first.

```
1      # dd if=/dev/urandom of=data bs=1 count=1024
2      # dd if=/dev/sda of=backup bs=1 count=1024 skip=4096
3      # dd if=data of=/dev/sda bs=1 seek=4096
4      # dd if=/dev/sda of=data1 bs=1 count=1024 skip=4096
5      # diff data data1
6      # dd if=backup of=/dev/sda bs=1 seek=4096
```

4.4.14 SPI Flash

- SPI1 CS0 and CS1



Connect the test board CN3 to the main board SPI1.

Pay attention to the connection orientation: the first pin of the test board must align with the first pin of SPI1 on the main board.

4.4.14.1 /dev/mtd0

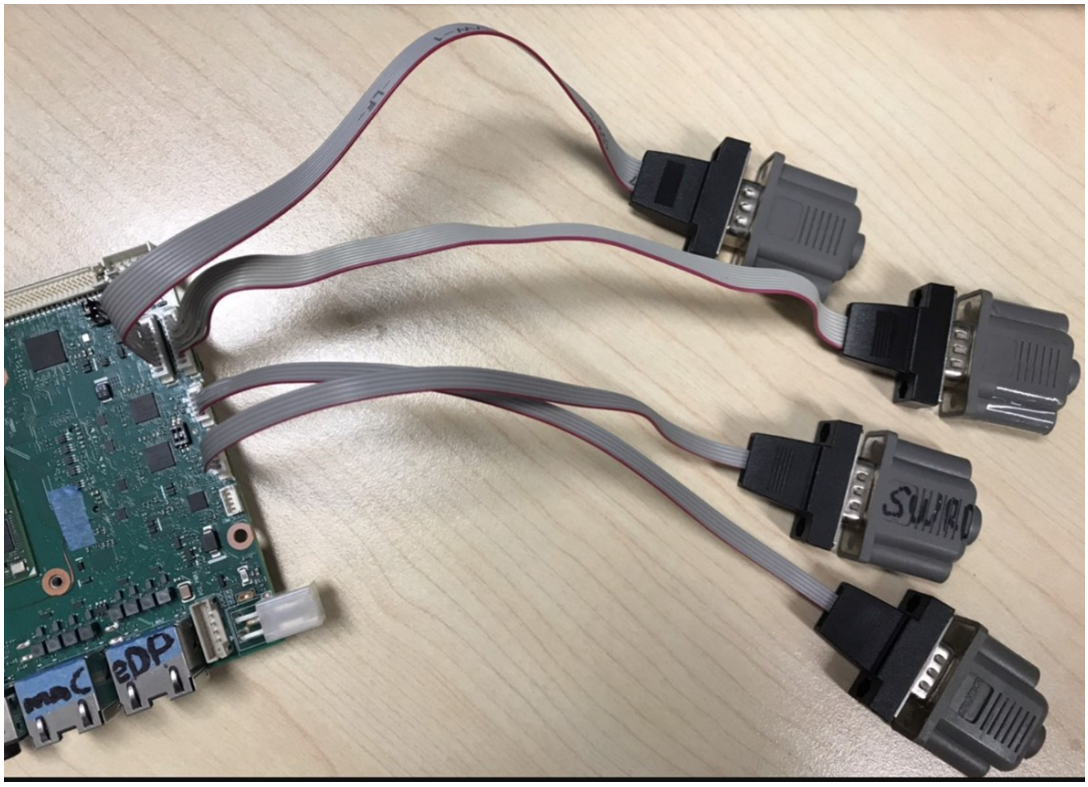
```
1      # dd if=/dev/urandom of=data bs=1 count=1024
2      # dd if=/dev/mtd0 of=backup bs=1 count=1024 skip=4096
3      # dd if=data of=/dev/mtd0 bs=1 seek=4096
4      # dd if=/dev/mtd0 of=data1 bs=1 count=1024 skip=4096
5      # diff data data1
6      # dd if=backup of=/dev/mtd0 bs=1 seek=4096
```

4.4.14.2 /dev/mtd1

```
1      # dd if=/dev/urandom of=data bs=1 count=1024
2      # dd if=/dev/mtd1 of=backup bs=1 count=1024 skip=4096
3      # dd if=data of=/dev/mtd1 bs=1 seek=4096
4      # dd if=/dev/mtd1 of=data1 bs=1 count=1024 skip=4096
5      # diff data data1
6      # dd if=backup of=/dev/mtd1 bs=1 seek=4096
```

4.4.15 RS232 Loopback

- UART 1 (Default RS-232 function): COM1
- UART 2 (Default RS-232 function): COM2
- UART 3: COM3
- UART 4: COM4



4.4.15.1 UART 1

```
1      # stty -F /dev/ttyHS1 -echo -onlcr 115200 raw
2      # cat /dev/ttyHS1 &
3      # echo "Serial Port Test" > /dev/ttyHS1
```

4.4.15.2 UART 2

```
1      # stty -F /dev/ttyHS2 -echo -onlcr 115200 raw
```

```
2       # cat /dev/ttyHS2 &
3       # echo "Serial Port Test" > /dev/ttyHS2
```

4.4.15.3 UART 3

```
1       # stty -F /dev/ttyHS3 -echo -onlcr 115200 raw
2       # cat /dev/ttyHS3 &
3       # echo "Serial Port Test" > /dev/ttyHS3
```

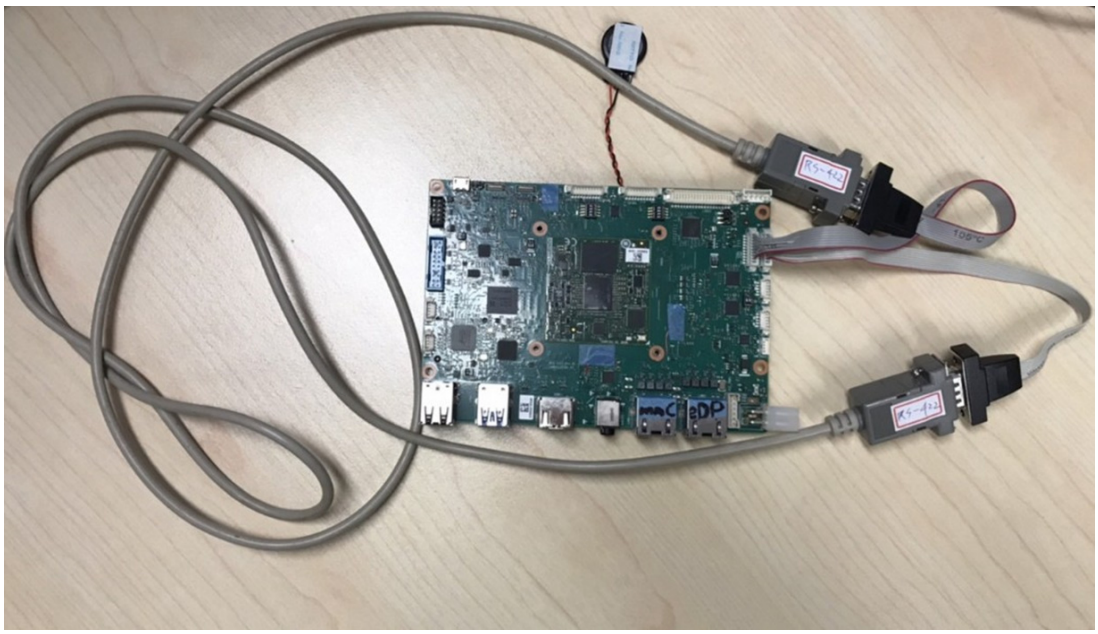
4.4.15.4 UART 4

```
1       # stty -F /dev/ttyHS4 -echo -onlcr 115200 raw
2       # cat /dev/ttyHS4 &
3       # echo "Serial Port Test" > /dev/ttyHS4
```

4.4.16 RS422

Use UART 1 and UART 2 for mutual transmission by the RS422 line.

- UART 1: Set the GPIO#631,GPIO#636 (UART MODE1,UART MODE0) to 1,1
- UART 2: Set the GPIO#587,GPIO#588 (UART MODE1,UART MODE0) to 1,1



4.4.16.1 UART 1

```
1       # echo 631 > /sys/class/gpio/export (UART MODE1)
2       # echo 636 > /sys/class/gpio/export (UART MODE0)
3       # echo out > /sys/class/gpio/gpio631/direction
4       # echo out > /sys/class/gpio/gpio636/direction
5       # echo 1 > /sys/class/gpio/gpio631/value
6       # echo 1 > /sys/class/gpio/gpio636/value
7       # stty -F /dev/ttyHS1 speed 115200 ignbrk -brkint -icrnl
        -imaxbel -opos
8       # cat /dev/ttyHS1 & 9
10
        # echo "Serial Test" > /dev/ttyHS1
        #   echo   -e   "123456789-123456789-123456789-123456789-
        123456789-\r" | tee
```

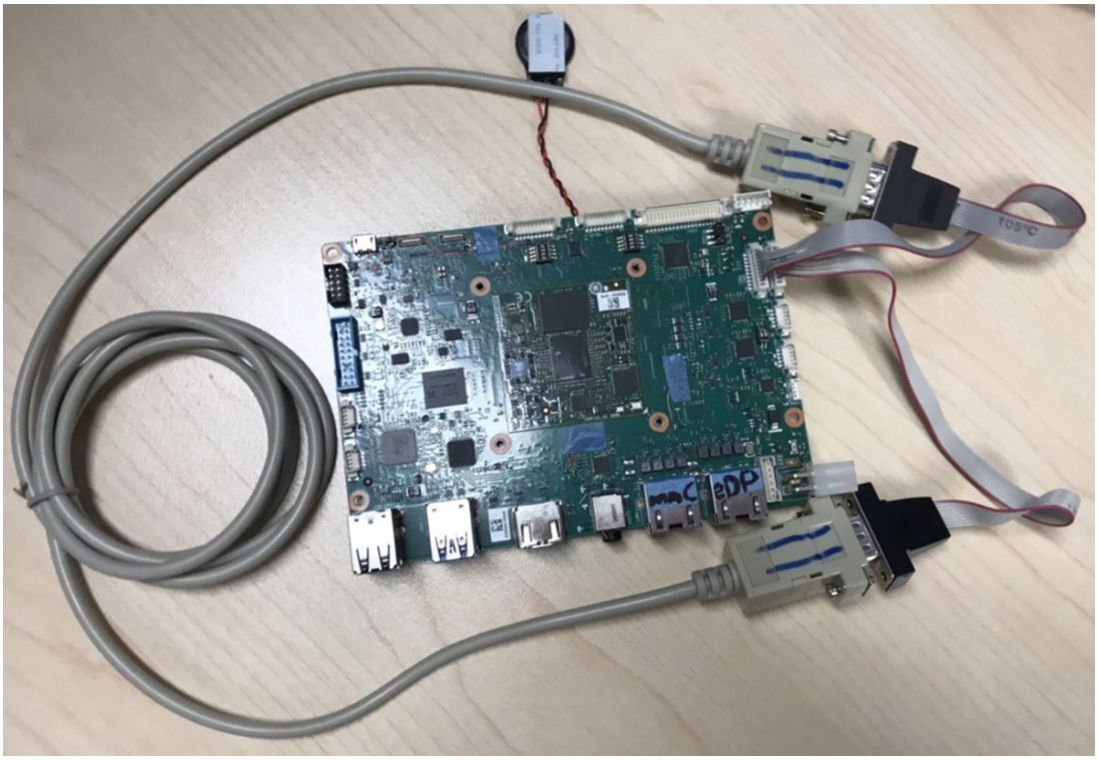
4.4.16.2 UART 2

```
1     # echo 587 > /sys/class/gpio/export (UART MODE1)
2     # echo 588 > /sys/class/gpio/export (UART MODE0)
3     # echo out > /sys/class/gpio/gpio587/direction
4     # echo out > /sys/class/gpio/gpio588/direction
5     # echo 1 > /sys/class/gpio/gpio587/value
6     # echo 1 > /sys/class/gpio/gpio588/value
7     # stty -F /dev/ttyHS2 speed 115200 ignbrk -brkint -icrnl
      -imaxbel -opos
8     # cat /dev/ttyHS2 &
9     # echo "Serial Test" > /dev/ttyHS2
10    #  echo  -e  "123456789-123456789-123456789-123456789-
      123456789-\r" | tee
```

4.4.17 RS485

Use UART 1 and UART 2 for mutual transmission by the RS485 line.

- UART 1: Set the GPIO#631,GPIO#636 (UART MODE1,UART MODE0) to 1,0
- UART 2: Set the GPIO#587,GPIO#588 (UART MODE1,UART MODE0) to 1,0



4.4.17.1 UART 1

```
1     # echo 631 > /sys/class/gpio/export (UART MODE1)
2     # echo 636 > /sys/class/gpio/export (UART MODE0)
3     # echo out > /sys/class/gpio/gpio631/direction
4     # echo out > /sys/class/gpio/gpio636/direction
5     # echo 1 > /sys/class/gpio/gpio631/value
6     # echo 0 > /sys/class/gpio/gpio636/value
7     # stty -F /dev/ttyHS1 speed 115200 ignbrk -brkint -icrnl
      -imaxbel -opos
```

```
8     # cat /dev/ttyHS1 &
9     # echo "Serial Test" > /dev/ttyHS1
10    #   echo   -e   "123456789-123456789-123456789-123456789-
      123456789-\r" | tee
```

4.4.17.2 UART 2

```
1     # echo 587 > /sys/class/gpio/export (UART MODE1)
2     # echo 588 > /sys/class/gpio/export (UART MODE0)
3     # echo out > /sys/class/gpio/gpio587/direction
4     # echo out > /sys/class/gpio/gpio588/direction
5     # echo 1 > /sys/class/gpio/gpio587/value
6     # echo 0 > /sys/class/gpio/gpio588/value
7     # stty -F /dev/ttyHS2 speed 115200 ignbrk -brkint -icrnl
      -imaxbel -opos
8     # cat /dev/ttyHS2 &
9     # echo "Serial Test" > /dev/ttyHS2
10    #   echo   -e   "123456789-123456789-123456789-123456789-
      123456789-\r" | tee
```

4.4.18 GPIO

GPIO1 (8 pins)

- GPIO_0 (GPIO_A_0<-->GPIO_14): gpio 549
- GPIO_1 (GPIO_A_1<-->GPIO_15): gpio 550
- GPIO_2 (GPIO_A_2<-->GPIO_16): gpio 551
- GPIO_3 (GPIO_A_3<-->GPIO_17): gpio 552
- GPIO_4 (GPIO_A_4<-->GPIO_18): gpio 553
- GPIO_5 (GPIO_B_5<-->GPIO_102): gpio 637
- GPIO_6 (GPIO_E_0<-->GPIO_109): gpio 644
- GPIO_7 (GPIO_E_1<-->GPIO_110): gpio 645

4.4.18.1 GPIO_0 and GPIO_1 Loopback Test

1. Connect the GPIO_A_0 and GPIO_A_1
2. Export the GPIO interface

```
1      # echo 549 > /sys/class/gpio/export
2      # echo 550 > /sys/class/gpio/export
```

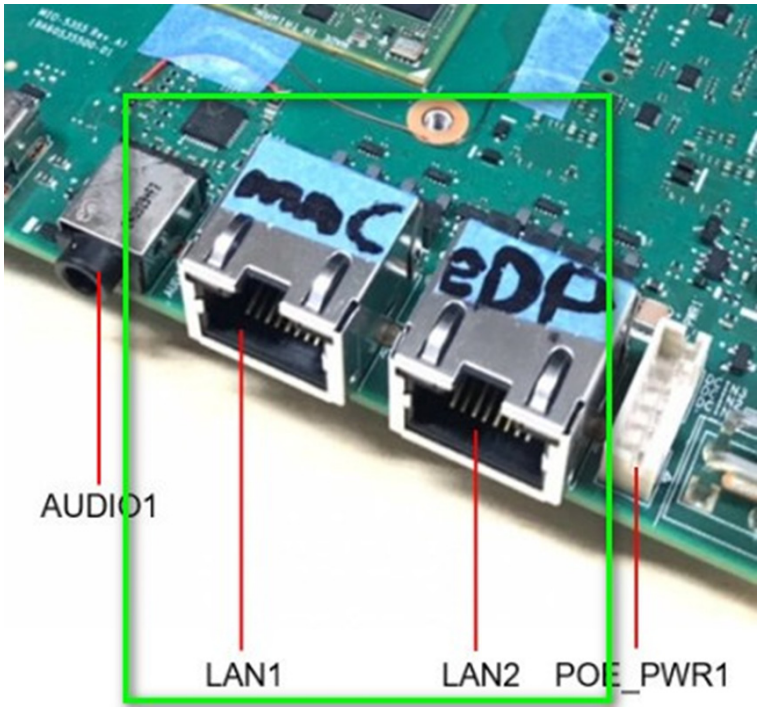
3. Set the GPIO direction

```
# echo out > /sys/class/gpio/gpio549/direction
# echo in > /sys/class/gpio/gpio550/direction
```

4. Set output value and check

```
# cat /sys/class/gpio/gpio550/value
0
# echo 1 > /sys/class/gpio/gpio549/value
# cat /sys/class/gpio/gpio550/value
1
```

4.4.19 Ethernet



4.4.19.1 Check Ethernet

```
# ifconfig
enP1p5s0f0 Link encap:EthernetHWaddr EE:A9:36:72:A7:B9
inet addr:172.22.12.138Bcast:172.22.15.255
Mask:255.255.25
inet6 addr: fe80::2009:4a63:5a32:d2ab/64  Scope:Link
inet6 addr: fe80::eca9:36ff:fe72:a7b9/64  Scope:Link
UP BROADCAST RUNNING MULTICASTMTU:1500Metric:1
RX packets:118 errors:0 dropped:10 overruns:0 frame:0
TX packets:37 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:27625  (26.9 KiB)  TX bytes:6142  (5.9 KiB)
Interrupt:239
enP1p5s0f1 Link encap:EthernetHWaddr EE:51:3E:06:D5:3C
UP BROADCAST MULTICASTMTU:1500Metric:1
```

```
15      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
16      TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
17          collisions:0 txqueuelen:1000
18          RX bytes:0 (0.0 B)TX bytes:0 (0.0 B)
19          Interrupt:244
20
21      lo   Link encap:Local Loopback
22
23      inet addr:127.0.0.1Mask:255.0.0.0
24      inet6 addr: ::1/128 Scope:Host
25      UP LOOPBACK RUNNINGMTU:65536Metric:1
26      RX packets:18 errors:0 dropped:0 overruns:0 frame:0
27      TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
28      collisions:0 txqueuelen:1000
        RX bytes:2272 (2.2 KiB)TX bytes:2272 (2.2 KiB)
```

4.4.19.2 Ping Test

```
1       # ping 8.8.8.8
2       PING 8.8.8.8 (8.8.8.8): 56 data bytes
3       64   bytes from 8.8.8.8: icmp_seq=0 ttl=113 time=5.320
        ms
4       64   bytes from 8.8.8.8: icmp_seq=1 ttl=113 time=7.445
        ms
5       64   bytes from 8.8.8.8: icmp_seq=2 ttl=113 time=7.367
        ms
6       64   bytes from 8.8.8.8: icmp_seq=3 ttl=113 time=7.431
        ms
7       64   bytes from 8.8.8.8: icmp_seq=4 ttl=113 time=6.394
        ms
```

4.4.19.3 Ethernet LED Lights Test

- Link LED Light

1. 10M - orange and green light: always off
2. 100M - orange light: always on
3. 1000M - green light: always on

- Active LED Light

1. 10M - green light: flashing on
2. 100M - green light: flashing on
3. 1000M - green light: flashing on

4.4.19.4 10M Speed Setting

```
1       # ethtool -s enP1p5s0f0 speed 10 duplex full
2       # ethtool -s enP1p5s0f1 speed 10 duplex full
```

4.4.19.5 100M Speed Setting

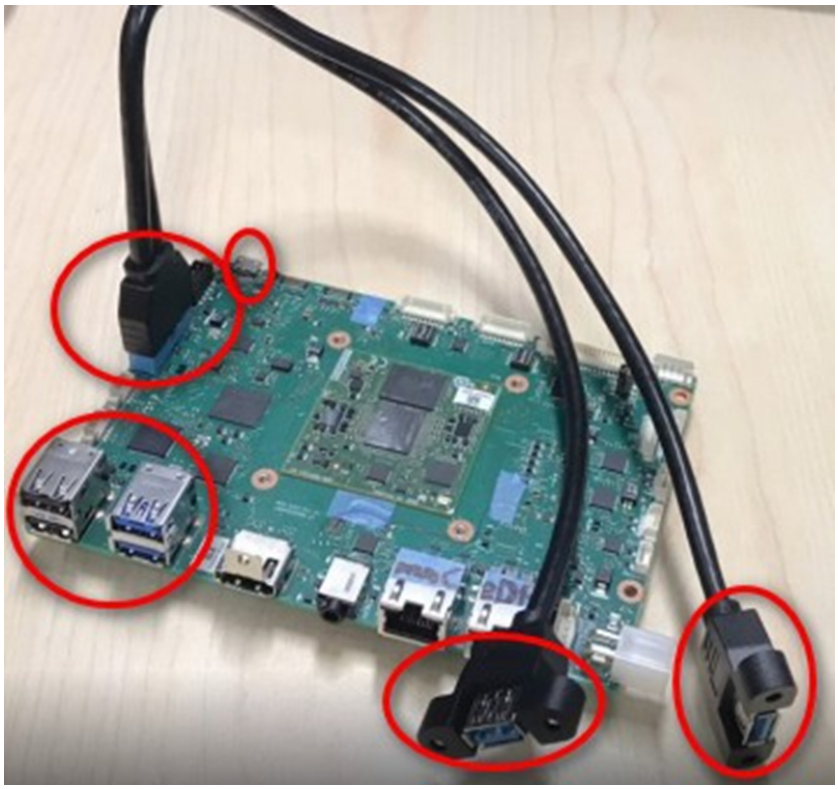
```
1       # ethtool -s enP1p5s0f0 speed 100 duplex full
2       # ethtool -s enP1p5s0f1 speed 100 duplex full
```

4.4.19.6 1000M Speed Setting

```
1      # ethtool -s enP1p5s0f0 speed 1000 duplex full
2      # ethtool -s enP1p5s0f1 speed 1000 duplex full
```

4.4.20 USB

- Micro USB: USB_EDL1
- USB 2.0/3.0 Type A: USB3_1
- USB 2.0 Type A: USB2_1
- Internal USB 2.0/3.0 Type A: USB1



4.4.20.1 Micro USB

Micro USB is only for the EDL download. If you need to use the adb or fastboot, you need to set the Micro USB to device mode.

```
1      # mount -t debugfs none /sys/kernel/debug
2      # echo device > /sys/kernel/debug/usb/a600000.usb/mode
```

4.4.20.2 USB 2.0/3.0 Type A

If you want to use the USB 2.0/3.0 Type A, don't connect the Micro USB. Then insert the USB 2.0/3.0 flash drive into the USB 2.0/3.0 Type A.

4.4.20.3 Check the USB flash drive

```
1      # lsusb -t
2      /:  Bus  03.Port      1:  Dev  1,      Class=root_hub,
       Driver=xhci-hcd/1p, 5000M
3          |   Port  1: Dev  2, If  0, Class=Hub,  Driver=hub/
       4p, 5000M
4              |   Port  1: Dev  4, If  0, Class=Mass Storage,
       Driver=usb-storage
```

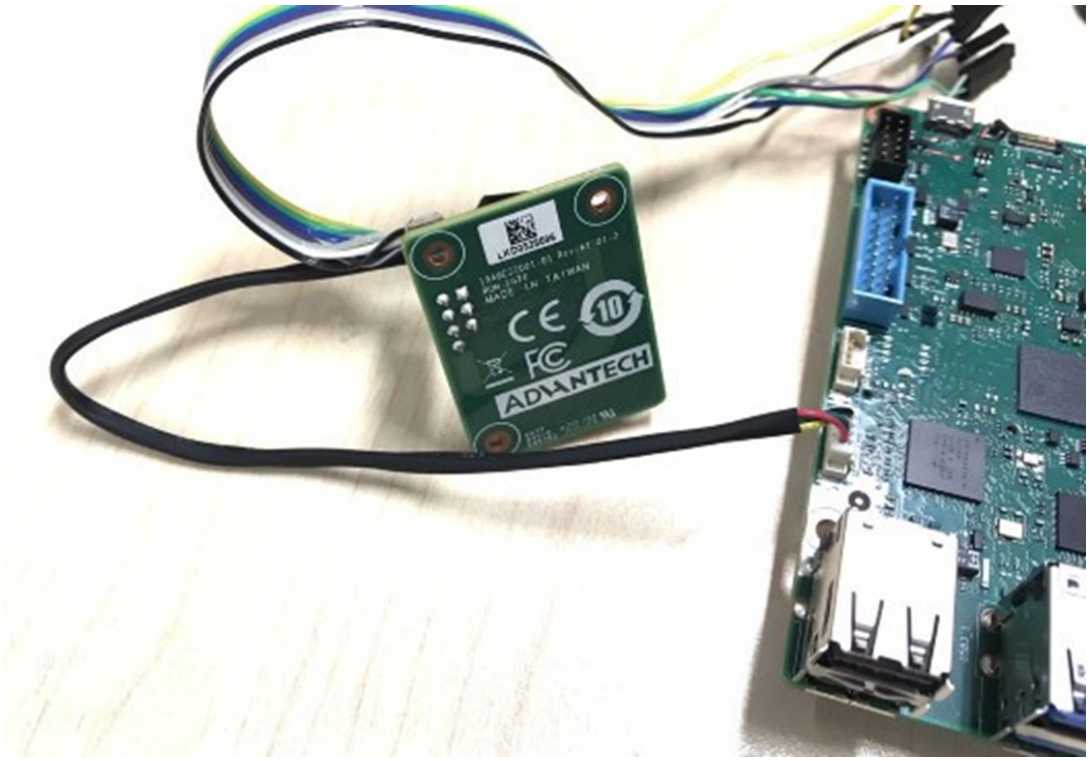
```
5       /:  Bus  02.Port     1:  Dev  1,     Class=root_hub,
        Driver=xhci-hcd/1p, 480M
6       /:  Bus  01.Port     1:  Dev  1,     Class=root_hub,
        Driver=xhci-hcd/1p, 480M
7           |   Port  1: Dev  2, If  0, Class=Hub,  Driver=hub/
        4p, 480M
8       |   Port   2:  Dev   7,  If   0,  Class=Mass  Storage,
        Driver=usb-storage
```

4.4.20.4 USB Flash Drive Read/Write

```
1       # dd if=/dev/urandom of=data bs=1 count=1024
2       # dd if=/dev/sda of=backup bs=1 count=1024 skip=4096
3       # dd if=data of=/dev/sda bs=1 seek=4096
4       # dd if=/dev/sda of=data1 bs=1 count=1024 skip=4096
5       # diff data data1
6       # dd if=backup of=/dev/sda bs=1 seek=4096
```

4.4.21 I2C

- I2C 0 (QPS615_I2C):
  0x77: QPS615
- I2C 1 (APPS_I2C):
  0x32: RTC
  0x50: EEPROM
  0x6D: PCIe CLKGEN
- I2C 3 (I2C_A):
  0x1A: RTL-5682 (Audio Codec)
  0x50: EEPROM
- I2C 9 (I2C_B):
  0x50: EEPROM
  0x57: EEPROM



4.4.21.1 I2C Detect

```
# i2cdetect -y -r 0
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:                         -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- UU

# i2cdetect -y -r 1
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:                         -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- UU -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: UU -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --

# i2cdetect -y -r 3
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:                         -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- UU -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
```

```
28     30: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
29     40: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
30     50: UU   --   --   --   --   --   --   --   --   --   --   ----
       ------
31     60: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
32     70: --   --   --   --   --   --   --   --
33
34     # i2cdetect -y -r 9
35         0   1   2   3   4   5   6   7   8   9   a   b   c
       d e f
36     00:                 --   --   --   --   --   --   --   --   ----
       ------
37     10: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
38     20: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
39     30: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
40     40: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
41     50: UU   --   --   --   --   --   --   UU   --   --   --   ----
       ------
42     60: --   --   --   --   --   --   --   --   --   --   --   ----
       ------
43     70: --   --   --   --   --   --   --   --
```

4.4.22 External RTC

Set system time to current, then write to RTC

```
1      # date 032010452024 && hwclock -w && date
2      Wed Mar  20 10:45:00 UTC  2024
3      Wed Mar  20 10:45:01 UTC  2024
```

Set one incorrect time, then read time from RTC to verify

```
1      # date 010100002000 && hwclock -r && date
2      Sat Jan  1 00:00:00 UTC  2000
3      2024-03-20 10:47:33.749407+00:00
4      Sat Jan  1 00:00:00 UTC  2000
```

Restore the RTC time to system time

```
1      # hwclock -s && date
2      Wed Mar  20 10:49:03 UTC  2024
```

4.4.23 Internal Watchdog

The system will enter the ramdump mode after the system crash about 6 seconds by the following command:

```
1       # echo c > /proc/sysrq-trigger
```

4.4.24 Camera

- MIPI CSI1 (IMX577)
- MIPI CSI2 (IMX577)

4.4.24.1 MIPI CSI1 (IMX577)

Preview

(1) 3840x2160@30:

```
1       # source /opt/qcom/qirp-sdk/qirp-setup.sh
2       #  export  XDG_RUNTIME_DIR=/dev/socket/weston  &&  export
        WAYLAND_DISPLAY=w
```

(2) 1920x2160@30:

```
1       # source /opt/qcom/qirp-sdk/qirp-setup.sh
2       #  export  XDG_RUNTIME_DIR=/dev/socket/weston  &&  export
        WAYLAND_DISPLAY=w
```

4.4.24.2 MIPI CSI2 (IMX577)

Preview

(1) 3840x2160@30:

```
1       # source /opt/qcom/qirp-sdk/qirp-setup.sh
2       #  export  XDG_RUNTIME_DIR=/dev/socket/weston  &&  export
        WAYLAND_DISPLAY=w
```

(2) 1920x2160@30:

```
1       # source /opt/qcom/qirp-sdk/qirp-setup.sh
2       #  export  XDG_RUNTIME_DIR=/dev/socket/weston  &&  export
        WAYLAND_DISPLAY=w
```

4.4.24.3 MIPI CSI1 (IMX577) and MIPI CSI2 (IMX577) Multi Camera Preview

```
1    # source /opt/qcom/qirp-sdk/qirp-setup.sh
2    # export XDG_RUNTIME_DIR=/dev/socket/weston && export
     WAYLAND_DISPLAY=w
3    # export XDG_RUNTIME_DIR=//dev/socket/weston && export
     WAYLAND_DISPLAY=
```

4.4.25 M.2 Key E

Supports the EWM-170BQ WIFI/BT module.

4.4.25.1 WIFI Connection

```
1    # lspci
2    0000:00:00.0 PCI bridge: Qualcomm Device 010b
3    0000:01:00.0 Network controller: Qualcomm QCNFA765 Wire-
     less Network Ada 4
5    # ifconfig wlp1s0
6    wlp1s0Link encap:EthernetHWaddr 00:0E:8E:BF:DE:0D
7    UP BROADCAST MULTICASTMTU:1500Metric:1
8    RX packets:0 errors:0 dropped:0 overruns:0 frame:0
9    TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
10   collisions:0 txqueuelen:1000
11   RX bytes:0  (0.0 B)  TX bytes:0  (0.0 B)
12
13   # wpa_supplicant -i wlp1s0 -Dnl80211 -c /etc/wpa_suppli-
     cant.conf &
14   # wpa_cli -i wlp1s0 -p /var/run/sockets remove_network
     all
```

```
15
16    # wpa_cli -i wlp1s0 -p /var/run/sockets add_network
17    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0ssid
      \"SSID\"
18    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0
      key_mgmt WPA-PSK
19    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0proto
      WPA RSN
20    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0
      auth_alg OPEN
21    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0pair-
      wise TKIP CCM
22    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0group
      TKIP CCMP
23    #   wpa_cli-iwlp1s0-p/var/run/socketsset_network0psk
      \"PASSWORD\"
24    # wpa_cli -i wlp1s0 -p /var/run/sockets select_network 0
25
26    Sometimes need to use the following command to reconnect
27    # wpa_cli -i wlp1s0 -p /var/run/sockets reconnect 28
29    # ifconfig wlp1s0
30    wlp1s0Link encap:EthernetHWaddr 00:0E:8E:BF:DE:0D
31        inet addr:172.20.10.8Bcast:172.20.10.15
      Mask:255.255.255.2
32        inet6                                        addr:
      2401:e180:8880:3d43:16fb:957b:355e:884f/64  Scope:
33        inet6 addr: fe80::b1eb:b874:c798:be6/64 Scope:Link
34        UP BROADCAST RUNNING MULTICASTMTU:1500Metric:1
35        RX packets:46 errors:0 dropped:0 overruns:0 frame:0
36        TX  packets:110  errors:0  dropped:0  overruns:0  car-
      rier:0
37        collisions:0 txqueuelen:1000
38        RX bytes:5116  (4.9 KiB)TX bytes:14985  (14.6  KiB)
39    # ping 8.8.8.8
40    PING 8.8.8.8 (8.8.8.8):  56 data bytes
41    64  bytes  from  8.8.8.8: icmp_seq=0 ttl=53 time=61.347
      ms
42    64  bytes  from  8.8.8.8: icmp_seq=1 ttl=53 time=48.723
      ms
43    64  bytes from 8.8.8.8: icmp_seq=2 ttl=53 time=46.027 ms
44    64  bytes from 8.8.8.8: icmp_seq=3 ttl=53 time=59.144 ms
45    64  bytes from 8.8.8.8: icmp_seq=4 ttl=53 time=49.458 ms
```

4.4.25.2 BT Connection

If you want to use the **EWM-170BQ** BT, please you don't connect the Micro USB.

```
1     # hciconfig
2     hci0: Type: Primary  Bus: USB
```

```
3          BD Address: 00:0E:8E:BC:4A:78  ACL MTU:1024:7    SCO
       MTU: 240:8
4      DOWN
5      RX bytes:857 acl:0 sco:0 events:59 errors:0
6      TX bytes:579 acl:0 sco:0 commands:59 errors:0
7
8      # hciconfig hc i0 up
9      # bluetoothctl
10     # discoverable on
11     # pairable on
12     # scan on
13     [NEW]  FC:18:3C:8D:75:F4 myphone
14     # scan off
15     # pair FC:18:3C:8D:75:F4
16     # connect FC:18:3C:8D:75:F4
```

4.4.26 M.2 Key B

- Supports the EWM-C401CQE01 4G module.
- Now insert the nano SIM card.

4.4.26.1 4G Connection

- EWM-C401CQE01

```
1      # lsusb
2      Bus 001 Device 005: ID  1508:1001 Fibocom Fibocom Modem
3
4      Using default  "at+gtusbmode=17"  mode to test:
```

```
# rmmod qmi_wwan
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" ""' us
# ping 8.8.8.8
PING 8.8.8.8  (8.8.8.8):  56 data bytes
64  bytes from  8.8.8.8: icmp_seq=0 ttl=114 time=162.628 ms
64  bytes from  8.8.8.8: icmp_seq=1 ttl=114 time=49.067 ms
64  bytes from 8.8.8.8: icmp_seq=2 ttl=114 time=47.258 ms
64  bytes from 8.8.8.8: icmp_seq=3 ttl=114 time=50.771 ms
64  bytes from 8.8.8.8: icmp_seq=4 ttl=114 time=40.334 ms
```

4.4.27 M.2 Key M

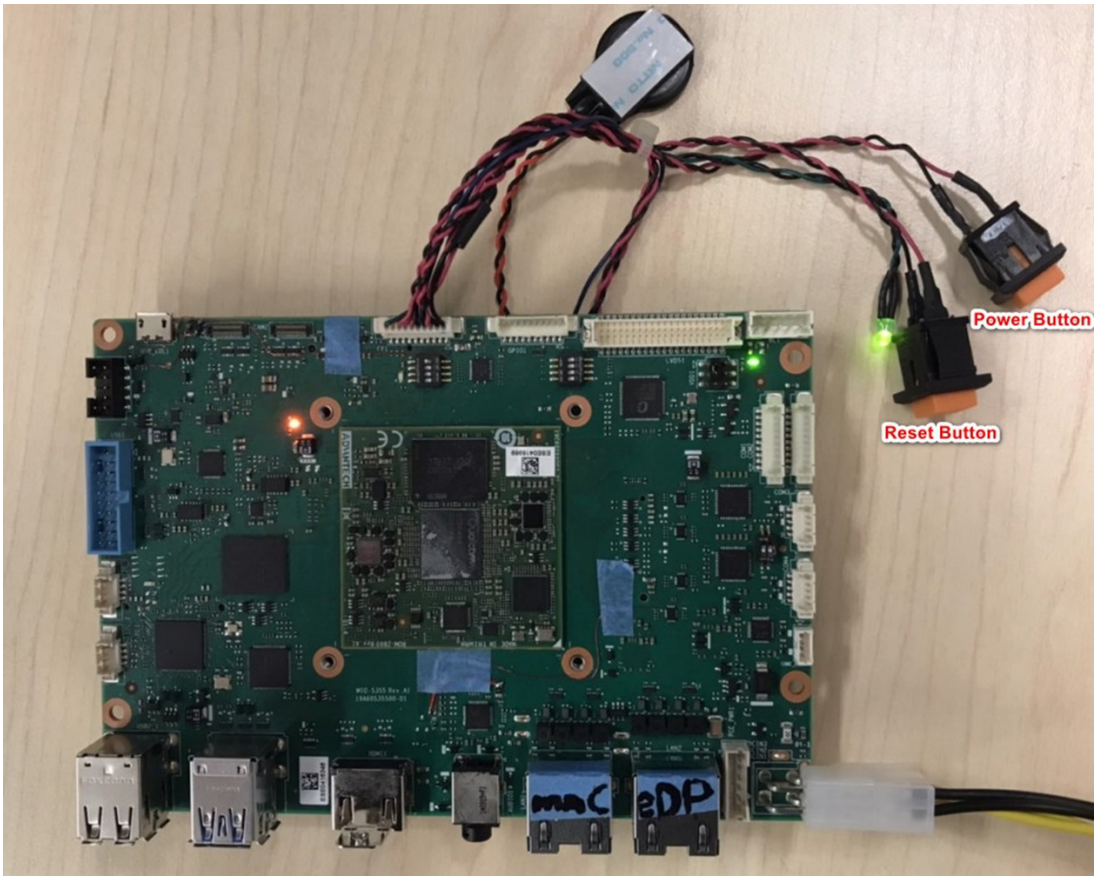
Connect the **SQF-C8BV2-128GDEDC** NVME SSD to following:

```
# lspci
0001:03:00.0  Non-Volatile  memory  controller:  Phison Electronics Corpora
# dd if=/dev/urandom of=data bs=1 count=1024
#  dd  if=/dev/nvme0n1p1  of=backup  bs=1  count=1024 skip=4096
# dd if=data of=/dev/nvme0n1p1 bs=1 seek=4096
#  dd  if=/dev/nvme0n1p1  of=data1  bs=1  count=1024 skip=4096
# diff data data1
```

```
8       # dd if=backup of=/dev/nvme0n1p1 bs=1 seek=4096
```

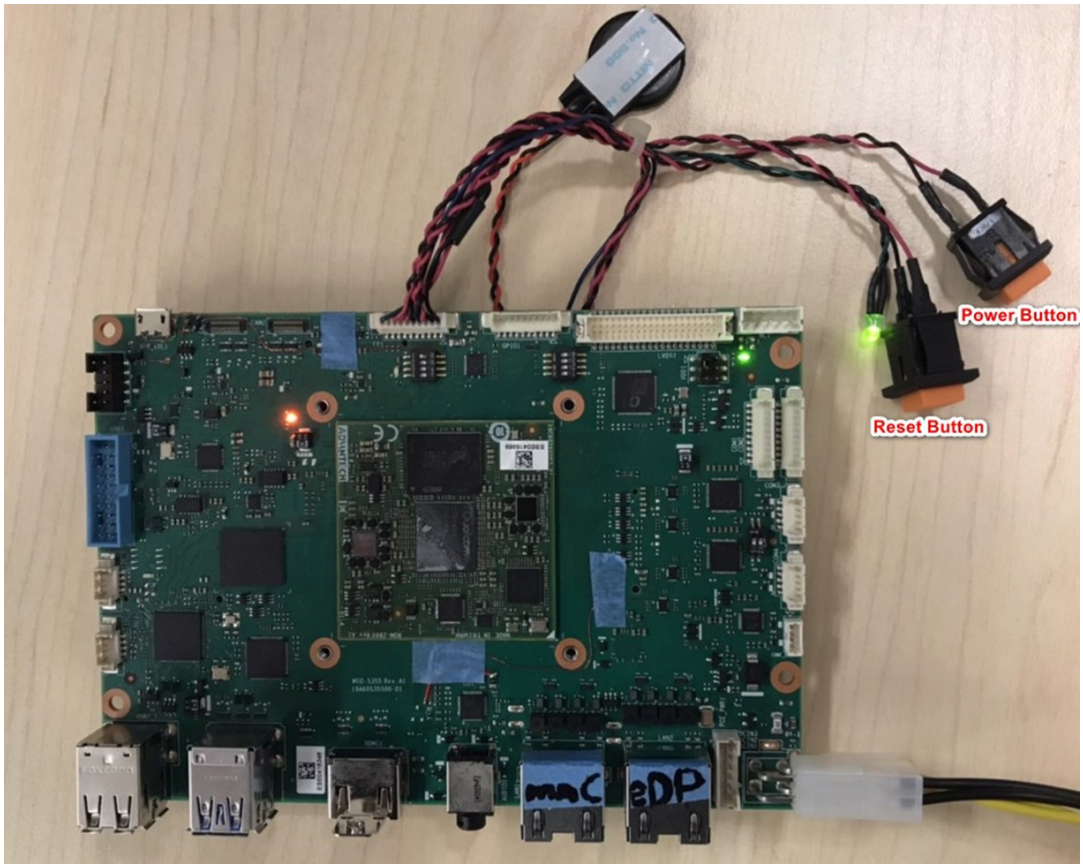
4.4.28 Power Button

- When the system is in a power off state, it can be powered on by short pressing the Power Key.
- When the system is in a power on state, it can be powered off by short pressing the Power Key.
- Force shutdown by pressing and holding the Power Key for 5 seconds.



4.4.29 Reset Button

- The system will reset after pressing the Reset Key.


Power Button
Reset Button

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