User Manual

AOM-3841

Rockchip RK3576 Cortex-A76 + A55 RTXe AI-on-Module

ADVANTECH

Enabling an Intelligent Planet

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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

FCC Class B

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 instruction manual, 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 assistance.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
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 calling:
   – 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 installation, please ensure the following items have been shipped:

- 1 x AOM-3841
- 4 x Screws
- 1 x China ROHS

Ordering Information

Part No.	Description
AOM-3841C8-3576AA1	AOM-Rugged,RK3576,0~70,4GB/32GB
AOM-3841W8-3576BA1	AOM-Rugged,RK3576J,-40~85,8GB/64GB
AOM-DB3500-SWNB1	RTXe Develop. Board for RISC AOM-Rugged Module

*Please contact us for a suitable cellular module for your region.

Optional Accessory

Part No.	Description
1970006141N001	Heat spreader
1970006140T001	Heat sink
96PSA-A60W24T2-3	Adapter 100-240V 60W 24V
1702002605	Power cord 3P EU 10A 250V 183cm
1702031801	Power cord 3P UK 10A 250V 183cm
1702002600	Power cord 3P UL 10A 125V 180cm
1700000237	Power cord 3P PSE 183 cm
1700009652	Power cord CCC 3P 10A 250V 183cm
AIW-162BS-GI1	WIFI6/BT Broadcom AP6275P, PCIe+UART M.2 Key-E
1751000651-01	Dipole Ant. WiFi 6E SMA/M-R BLK
1751000649-01	Cable Ant. SMA/F MHF4L/113
968DD00342	5G Module, RM520NGLAA M.2 Key-B
1751000625-01	Cable Ant. SMA/F MHF4L/113 BLK
1750009372-01	Ant.SMA/M 90/180 5G BLK 167mm
9696EG6A000	RTL8211FS-CG LAN Board
9696EG57001	ALC5640 Code Board

*Please contact us for suggesting suitable cellular module for your region.

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
    – The power cord or plug is damaged.
    – Liquid has penetrated the equipment.
    – The equipment has been exposed to moisture.
    – The equipment is malfunctioning, or does not operate according to the user manual.
    – The equipment has been dropped and damaged.
    – The equipment shows obvious signs of breakage.

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

Contents

Chapter 1

General Introduction

This chapter gives background information on the AOM-3841.

Sections include:

■ Introduction

■ Specifications

1.1 Introduction

The Advantech AOM-3841 RTXe AI-on-Module is powered by a Rockchip RK3576 SoC which includes Quad Arm Cortex-A72 and Quad Cortex-A53 processors, 6Tops NPU and a high-performance Arm Mali-G52 3D graphics engine. It also provides a rich display interface supported with HDMI, DP, eDP to meet different display requirements. AOM-3841 offers various high-speed interfaces, including 1 x PCIe 2.1/SATA 3.1, 1 x PCIe 2.1/SATA 3.1/USB3.2 Gen1, 2 x GMAC, and 3 x 4 Lane MIPI-CSI. These interfaces can meet a variety of high-rate transmission applications, Wi-Fi 6, and wireless 5G connectivity targeted at big data and other industrial applications.

The AOM-3841 is paired with the Advantech AOM-DB3500 RTXe development board for faster end-product peripheral integration and time-to-market. The reference schematics and layout checklist documentation for carrier board development will be provided along with the open-sourced Linux BSP, test utilities, hardware design utilities, and reference drivers.

1.2 Product Features

Table 1.1: Product Features		
Form Factor		**RTXe via BTB Connector**
Processor System	CPU	Rockchip RK3576 Arm Quad Cortex-A72 2.2GHz and Quad Cortex-A53 2.0GHz
	NPU	Up to 6.0 Tops Support: TensorFlow, Caffe, Tflite, Pytorch, Onnx NN, Android NN, etc.
Memory	Capacity	Onboard LPDDR4 up to 4/8GB
	Flash	32/64 GB eMMC(default) or UFS
Graphics	Graphics Engine	Arm Mali-G52 C3 GPU, High performance OpenGL ES 1.1, 2.0 and 3.2, OpenCL 2.0, Vulkan 1.1, etc.
	H/W Video Codec	Decoder: OpenGL ES 1.1, 2.0 and 3.2, OpenCL 2.0, Vulkan 1.1, etc Encoder: OpenGL ES 1.1, 2.0 and 3.2, OpenCL 2.0, Vulkan 1.1, etc
Display	Display out	1 x HDMI 2.0 1 x DP 1.4 (USB3.0 OTG/DP1.4 Alt of TYPEC) 1 x MIPI-DSI
GMAC	Speed	2 x RGMII 10/100/1000 Mbps
RTC	RTC	Yes
Watch Dog Timer	Watch Dog Timer	HW watch dog by MCU. 0~65535s

Table 1.1: Product Features		
I/O	PCIe/SATA/USB	1 x PCIe 2.1/SATA 3.1 1 x PCIe 2.1/SATA 3.1/USB3.2 Gen1 1 x USB 3.0 OTG(USB3.0 OTG/DP1.4 Alt of TYPEC)
	Audio	2 x I2S
	SDIO	1
	SPI	2
	UART	1 x 2-wire UART for debug 1 x 2-wire UART 2 x 4-wire UART
	ADC	2
	CAN	2 x CAN-FD
	GPIO/PWM	1
	I2C	2
	Camera Input	3 x MIPI CSI (4Lane)
Power	Power Supply Voltage	5V+-5% DC-in
Environment	Operational Temperature	0 ~ 70°C/-40 ~ 85°C
Mechanical	Dimensions (W x D)	77 x 65 mm
Certifications		CE/FCC Class B
Operation System		Linux Debian12 & Android15

1.3 Mechanical Specifications

- **Dimension:** RTXe form factor size: (D x W) 77 x 65 mm
- **Height on Top:** 2 mm
- **Height on Bottom:** 1.5 mm
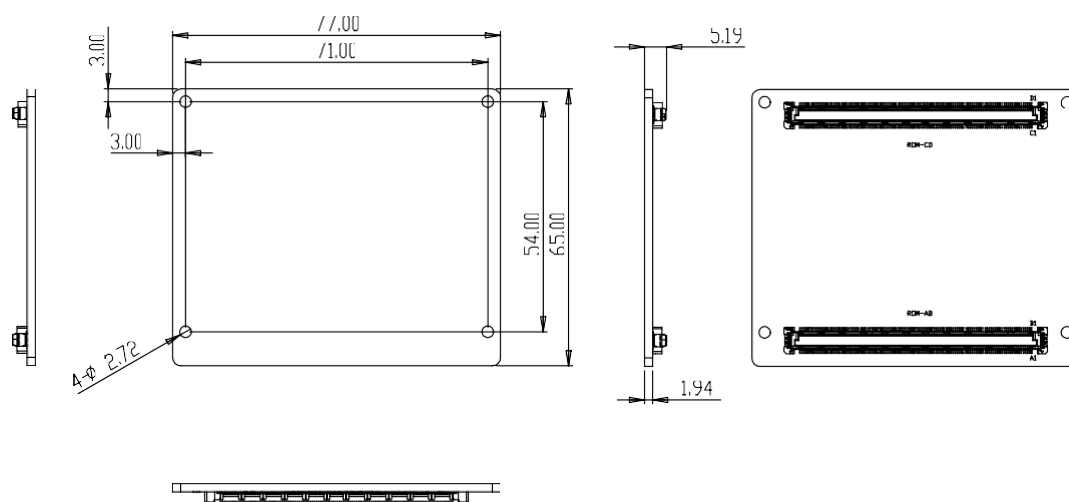
1.4 Electrical Specifications

- **Power Supply Voltage:** DC-in 5V+-5%
- **Power Supply Current:**

Table 1.2: Power Supply Current			
Model	Maximum mode	Idle mode	Sleep mode
AOM-3841	4.92W	0.76W	0.08W

Test Conditions:
1. Test loading:
   - Maximum load mode: Running programs*
   - Idle mode: DUT power management off and no running any program
2. OS: Debian12

*Programs software: Burnin.sh (full loading for CPU+NPU+GPU+VPU)

1.5 Environmental Specifications

- **Operating Temperature:** 0 ~ 70 °C/-40 ~ 85 °C
- **Operating Humidity:** 40°C @ 95% relative humidity, non-condensing
- **Storage Temperature:** -40 ~ 85 °C
- **Storage Humidity:** 95% @ 60 °C

Chapter **2**

Hardware Installation

This chapter gives connector information on AOM-3841.

Sections include:

■ Block Diagram
■ Pin Definition
■ Quick Start Guide

2.1 Block Diagram
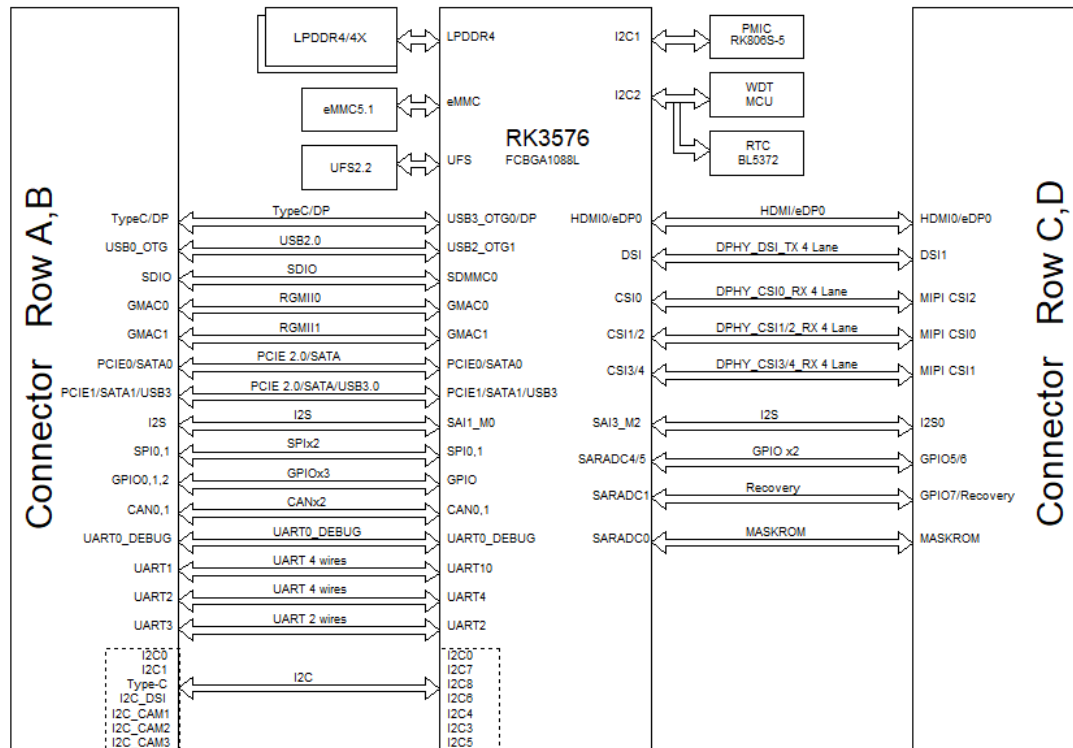
Figure 2.1 Block Diagram

2.2 Pin Definition

Please refer to the 440 Pin RTXe pin definitions as detailed below:

Table 2.1: AOM-3841 Pin-out			
A-Pin	**A Side**	**I/F**	**AOM-3841 pin out**
A1	GND	GND	GND
A2	SD0_CLK	SDIO	SDMMC0_CLK
A3	SD0_CMD	SDIO	SDMMC0_CMD
A4	SD0_D0	SDIO	SDMMC0_D0
A5	SD0_D1	SDIO	SDMMC0_D1
A6	SD0_D2	SDIO	SDMMC0_D2
A7	SD0_D3	SDIO	SDMMC0_D3
A8	SD0_CD#	SDIO	SDMMC0_DET_L
A9	SD0_VDD_EN	SDIO	SDMMC0_PWREN_H
A10	SD0_IOPWR	SDIO	VCCIO_SD_S0
A11	GND	GND	GND
A12	SD0_WP	SDIO	N.C.
A13	USB0_D-	USB	N.C.
A14	USB0_D+	USB	N.C.
A15	GND	GND	GND
A16	USB3_A_SS_TX-	USB	N.C.
A17	USB3_A_SS_TX+	USB	N.C.
A18	GND	GND	GND
A19	USB3_A_SS_RX-	USB	N.C.

Table 2.1: AOM-3841 Pin-out			
A20	USB3_A_SS_RX+	USB	N.C.
A21	GND	GND	GND
A22	TYPEC_OTG_VBUSDET	USB	USB2_OTG0_VBUSDET
A23	USB1_HOST_PWR_EN	USB	N.C.
A24	USB1_HOST_OC#	USB	N.C.
A25	USB0_HOST_PWR_EN	USB	N.C.
A26	USB0_HOST_OC#	USB	N.C.
A27	USB0_OTG_PWR_EN	USB	USB2_OTG1_PWREN_H
A28	USB0_OTG_OC#	USB	USB2_OTG1_OC#
A29	USB0_OTG_ID	USB	USB2_OTG1_ID
A30	USB0_OTG_VBUS_DET	USB	USB2_OTG1_VBUSDET
A31	GND	GND	GND
A32	USB0_OTG_D-	USB	USB2_OTG1_DM
A33	USB0_OTG_D+	USB	USB2_OTG1_DP
A34	GND	GND	GND
A35	GMAC0_TXD0	GMAC	GMAC1_TXD0
A36	GMAC0_TXD1	GMAC	GMAC1_TXD1
A37	GMAC0_TXD2	GMAC	GMAC1_TXD2
A38	GMAC0_TXD3	GMAC	GMAC1_TXD3
A39	GMAC0_TX_CTL	GMAC	GMAC1_TXCTL
A40	GMAC0_TXC	GMAC	GMAC1_TXCLK
A41	GND	GND	GND
A42	GMAC0_RXD0	GMAC	GMAC1_RXD0
A43	GMAC0_RXD1	GMAC	GMAC1_RXD1
A44	GMAC0_RXD2	GMAC	GMAC1_RXD2
A45	GMAC0_RXD3	GMAC	GMAC1_RXD3
A46	GMAC0_RX_CTL	GMAC	GMAC1_RXCTL
A47	GMAC0_RXC	GMAC	GMAC1_RXCLK
A48	GMAC0_RST#	GMAC	GMAC1_RSTn
A49	GMAC0_MDIO	GMAC	GMAC1_MDIO_M0
A50	GMAC0_MDC	GMAC	GMAC1_MDC_M0
A51	GND	GND	GND
A52	INTB0#	GMAC	INTB1#
A53	GMAC0_MCLK_IN	GMAC	GMAC1_MCLK
A54	GMAC1_MDIO	GMAC	GMAC0_MDIO_M0
A55	GMAC1_MDC	GMAC	GMAC0_MDC_M0
A56	GMAC1_MCLK_IN	GMAC	GMAC0_MCLK
A57	GND	GND	GND
A58	GMAC1_TXD0	GMAC	GMAC0_TXD0
A59	GMAC1_TXD1	GMAC	GMAC0_TXD1
A60	GND	GND	GND
A61	GMAC1_TXD2	GMAC	GMAC0_TXD2
A62	GMAC1_TXD3	GMAC	GMAC0_TXD3
A63	GMAC1_TX_CTL	GMAC	GMAC0_TXCTL
A64	GMAC1_TXC	GMAC	GMAC0_TXCLK
A65	GMAC1_RXD0	GMAC	GMAC0_RXD0
A66	GND	GND	GND
A67	GMAC1_RXD1	GMAC	GMAC0_RXD1
A68	GMAC1_RXD2	GMAC	GMAC0_RXD2
A69	GMAC1_RXD3	GMAC	GMAC0_RXD3
A70	GND	GND	GND

Table 2.1: AOM-3841 Pin-out			
A71	GMAC1_RX_CTL	GMAC	GMAC0_RXCTL
A72	GMAC1_RXC	GMAC	GMAC0_RXCLK
A73	GMAC1_RST#	GMAC	GMAC0_RSTn
A74	INTB1#	GMAC	INTB0#
A75	I2S0_DIN/SPDIF_IN	I2S/SPDIF	SAI1_SDI0_M0
A76	I2S1_DOUT/ SPDIF_OUT	I2S/SPDIF	SAI1_SDO0_M0
A77	I2S1_MCLK/ SPDIF_EXT_CLK	I2S/SPDIF	SAI1_MCLK_M0
A78	I2S1_LRCLK	I2S	SAI1_LRCK_M0
A79	I2S1_BCLK	I2S	SAI1_SCLK_M0
A80	GND	GND	GND
A81	UART0_TX (Debug)	UART	UART0_TX_M0_DEBUG
A82	UART0_RX (Debug)	UART	UART0_RX_M0_DEBUG
A83	UART0_RTS#	UART	N.C.
A84	UART0_CTS#	UART	N.C.
A85	BOOT_SEL0#	SYSTEM BOOT	N.C.
A86	BOOT_SEL1#	SYSTEM BOOT	N.C.
A87	BOOT_SEL2#	SYSTEM BOOT	N.C.
A88	GPIO0/ADC/PWM	GPIO	GPIO1_D2_PWM1_CH3
A89	GPIO1/ADC/PWM	GPIO	GPIO1_D2_PWM1_CH4
A90	GND	GND	GND
A91	GPIO2/ADC/PWM	GPIO	GPIO0_C5_TYPEC_INT#
A92	VCC_RTC	POWER	VDD_RTC
A93	WDT_OUT	WDT	WDT_TIME_OUT#
A94	WDT_EN	WDT	WDOG_EN
A95	WDT_TRG#	WDT	WDT_TRIG#
A96	WDT_DATA	WDT	I2C2_SDA_M0
A97	WDT_CLK	WDT	I2C2_SCL_M0
A98	MASKROM	MASKROM	MASKROM#
A99	VCC	POWER	VDD_IN
A100	GND	GND	GND
A101	VCC	POWER	VDD_IN
A102	VCC	POWER	VDD_IN
A103	VCC	POWER	VDD_IN
A104	VCC	POWER	VDD_IN
A105	VCC	POWER	VDD_IN
A106	VCC	POWER	VDD_IN
A107	VCC	POWER	VDD_IN
A108	VCC	POWER	VDD_IN
A109	VCC	POWER	VDD_IN
A110	GND	GND	GND
P-Pin	B Side	I/F	AOM-3841 pin out
B1	GND	GND	GND
B2	TYPEC_SS_TX0-/DP0_D1-	USB	USB3_OTG0_SSTX1N/DP_TX_D1N
B3	TYPEC_SS_TX0+/DP0_D1+	USB	USB3_OTG0_SSTX1P/DP_TX_D1P
B4	GND	GND	GND
B5	TYPEC_SS_RX0-/DP0_D0-	USB	USB3_OTG0_SSRX1N/DP_TX_D0N
B6	TYPEC_SS_RX0+/DP0_D0+	USB	USB3_OTG0_SSRX1P/DP_TX_D0P
B7	GND	GND	GND

Table 2.1: AOM-3841 Pin-out			
B8	TYPEC_SS_TX1-/DP0_D3-	USB	USB3_OTG0_SSTX2N/DP_TX_D3N
B9	TYPEC_SS_TX1+/DP0_D3+	USB	USB3_OTG0_SSTX2P/DP_TX_D3P
B10	NULL		N.C.
B11	GND	GND	GND
B12	TYPEC_SS_RX1-/DP0_D2-	USB	USB3_OTG0_SSRX2N/DP_TX_D2N
B13	TYPEC_SS_RX1+/DP0_D2+	USB	USB3_OTG0_SSRX2P/DP_TX_D2P
B14	GND	GND	GND
B15	TYPEC_OTG_D-	USB	USB2_OTG0_DM
B16	TYPEC_OTG_D+	USB	USB2_OTG0_DP
B17	GND	GND	GND
B18	TYPEC_SBU1/DP0_AUX+	USB	DP_TX_AUXP
B19	TYPEC_SBU2/DP0_AUX-	USB	DP_TX_AUXN
B20	TYPEC_OTG_ID	USB	USB2_OTG0_ID
B21	GND	GND	GND
B22	USB3_B_SS_TX-	USB	N.C.
B23	USB3_B_SS_TX+	USB	N.C.
B24	GND	GND	GND
B25	USB3_B_SS_RX-	USB	N.C.
B26	USB3_B_SS_RX+	USB	N.C.
B27	GND	GND	GND
B28	I2C_TYPEC_DATA/DP0_AUX_SEL	- I2C	I2C8_SDA_M2
B29	I2C_TYPEC_DATA/DP0_HPD	I2C	I2C8_SCL_M2
B30	PCIE20_A_REQ#/SATA0_ACT#	PCIe	PCIE0_CLKREQn_M0
B31	GND	GND	GND
B32	USB1_D-	USB	N.C.
B33	USB1_D+	USB	N.C.
B34	GND	GND	GND
B35	PCIE20_A_TX-/SATA0_TX-/ USB3_C_TX-	PCIe	PCIE0_TXN/SATA0_TXN
B36	PCIE20_A_TX+/SATA0_TX+/ USB3_C_TX+	PCIe	PCIE0_TXP/SATA0_TXP
B37	GND	GND	GND
B38	PCIE20_A_RX-/SATA0_RX-/ USB3_C_RX-	PCIe	PCIE0_RXN/SATA0_RXN
B39	PCIE20_A_RX+/SATA0_RX+/	PCIe	PCIE0_RXP/SATA0_RXP
B40	PCIE20_A_RST#	PCIe	PCIE0_PERSTn
B41	GND	GND	GND
B42	PCIE20_A_CLK-	PCIe	PCIE0_REFCLKN
B43	PCIE20_A_CLK+	PCIe	PCIE0_REFCLKP
B44	GND	GND	GND
B45	PCIE20_B_TX-/SATA1_TX-/ USB3_D_TX-	PCIe	PCIE1_TXN/SATA1_TXN/ USB3_OTG1_SSTXN
B46	PCIE20_B_TX+/SATA1_TX+/ USB3_D_TX+	PCIe	PCIE1_TXP/SATA1_TXP/ USB3_OTG1_SSTXP
B47	GND	GND	GND
B48	PCIE20_B_RX-/SATA0_RX-/ USB3_D_RX-	PCIe	PCIE1_RXN/SATA1_RXN/ USB3_OTG1_SSRXN
B49	PCIE20_B_RX+/SATA0_RX+/	PCIe	PCIE1_RXP/SATA1_RXP/ USB3_OTG1_SSRXP
B50	PCIE20_B_RST#	PCIe	PCIE1_PERSTn
B51	GND	GND	GND
B52	PCIE20_B_CLK-	PCIe	PCIE1_REFCLKN

Table 2.1: AOM-3841 Pin-out			
B53	PCIE20_B_CLK+	PCIe	PCIE1_REFCLKP
B54	GND	GND	GND
B55	PCIE20_B_REQ#/SATA1_ACT#	PCIe	PCIE1_CLKREQn_M0
B56	I2C0_CLK/I3C0_CLK	I2C	I2C0_SCL_M1_I3C0_GP
B57	I2C0_DAT/I3C0_DATA	I2C	I2C0_SDA_M1_I3C0_GP
B58	I2C1_CLK/I3C1_CLK	I2C	I2C7_SCL_M2
B59	I2C1_DAT/I3C1_DATA	I2C	I2C7_SDA_M2
B60	GND	GND	GND
B61	CAN0_TX	CAN	CAN0_TX_M2
B62	CAN0_RX	CAN	CAN0_RX_M2
B63	CAN1_TX	CAN	CAN1_TX_M2
B64	CAN1_RX	CAN	CAN1_RX_M2
B65	SPI0_CLK	SPI	SPI0_CLK_M0
B66	SPI0_MISO	SPI	SPI0_MISO_M0
B67	SPI0_MOSI	SPI	SPI0_MOSI_M0
B68	SPI0_CS0#	SPI	SPI0_CSN0_M0
B69	SPI0_CS1#	SPI	SPI0_CSN1_M0
B70	GND	GND	GND
B71	SPI1_CLK	SPI	SPI1_CLK_M0
B72	SPI1_MISO	SPI	SPI1_MISO_M0
B73	SPI1_MOSI	SPI	SPI1_MOSI_M0
B74	SPI1_CS0#	SPI	SPI1_CSN0_M0
B75	SPI1_CS1#	SPI	SPI1_CSN1_M0
B76	UART1_TX	UART	UART10_TX_M1
B77	UART1_RX	UART	UART10_RX_M1
B78	UART1_RTS#	UART	UART10_RTSN_M1
B79	UART1_CTS#	UART	UART10_CTSN_M1
B80	GND	GND	GND
B81	UART2_TX	UART	UART4_TX_M1
B82	UART2_RX	UART	UART4_RX_M1
B83	UART2_RTS#	UART	UART4_RTSN_M1
B84	UART2_CTS#	UART	UART4_CTSN_M1
B85	UART3_TX	UART	UART2_TX_M0
B86	UART3_RX	UART	UART2_RX_M0
B87	UART3_RTS#	UART	N.C.
B88	UART3_CTS#	UART	N.C.
B89	VCC_SEL	PM	VSET
B90	GND	GND	GND
B91	CB_PWR_EN	PM	CB_PWR_EN
B92	CB_PGOOD	PM	CB_PGOOD
B93	RESET_IN#	PM	RESET_IN#
B94	RESET_OUT#	PM	RESET_OUT#
B95	PWR_BTN#	PM	POWER_BTN#
B96	HOST_PGOOD	PM	PMIC_EXT_EN_OUT
B97	SLEEP#	PM	N.C.
B98	WAKE#	PM	N.C.
B99	VCC	POWER	+VDD_IN
B100	GND	GND	GND
B101	VCC	POWER	+VDD_IN
B102	VCC	POWER	+VDD_IN
B103	VCC	POWER	+VDD_IN

Table 2.1: AOM-3841 Pin-out			
B104	VCC	POWER	+VDD_IN
B105	VCC	POWER	+VDD_IN
B106	VCC	POWER	+VDD_IN
B107	VCC	POWER	+VDD_IN
B108	VCC	POWER	+VDD_IN
B109	VCC	POWER	+VDD_IN
B110	GND	GND	GND
P-Pin	**C Side**	**I/F**	**AOM-3841 pin out**
C1	GND	GND	GND
C2	GND	GND	GND
C3	CSI2_D0-/HDMI_RX_D0-	HDMI	MIPI_DPHY_CSI0_RX_D0N
C4	CSI2_D0+/HDMI_RX_D0+	HDMI	MIPI_DPHY_CSI0_RX_D0P
C5	GND	GND	GND
C6	CSI2_D1-/HDMI_RX_D1-	HDMI	MIPI_DPHY_CSI0_RX_D1N
C7	CSI2_D1+/HDMI_RX_D1+	HDMI	MIPI_DPHY_CSI0_RX_D1P
C8	GND	GND	GND
C9	CSI2_D2-/HDMI_RX_D2-	HDMI	MIPI_DPHY_CSI0_RX_D2N
C10	CSI2_D2+/HDMI_RX_D2+	HDMI	MIPI_DPHY_CSI0_RX_D2P
C11	GND	GND	GND
C12	CSI2_D3-/HDMI_RX_CK-	HDMI	MIPI_DPHY_CSI0_RX_D3N
C13	CSI2_D3+/HDMI_RX_CK+	HDMI	MIPI_DPHY_CSI0_RX_D3P
C14	GND	GND	GND
C15	CSI2_CK-/HDMI_RX_CEC	HDMI	MIPI_DPHY_CSI0_RX_CLKN
C16	CSI2_CK+/HDMI_RX_HPD	HDMI	MIPI_DPHY_CSI0_RX_CLKP
C17	GND	GND	GND
C18	CSI2_RST#	CSI	MIPI_DCPHY_CSI0_CAM0_RST_H
C19	CSI2_PWR#/HDMI_RX_DET#	HDMI	MIPI_DPHY_CSI0_CAM0_PWREN_H
C20	CSI2_MCK	CSI	MIPI_DCPHY_CSI0_CAM0_CLKOUT
C21	GND	GND	GND
C22	I2C_CSI2_DATA/CSI2_TX-/HDMI_SDA	HDMI	I2C4_SDA_M3_MIPI_CAM0
C23	I2C_CSI2_CLK/CSI2_TX+/HDMI_SCL	HDMI	I2C4_SCL_M3_MIPI_CAM0
C24	GND	GND	GND
C25	PCIE_SMCLK	PCIe	N.C.
C26	PCIE_SMDAT	PCIe	N.C.
C27	GPIO3/ADC/PWM	GPIO	GPIO0_B0
C28	GND	GND	GND
C29	PCIE30_C_TX-	PCIe	N.C.
C30	PCIE30_C_TX+	PCIe	N.C.
C31	GND	GND	GND
C32	PCIE30_C_RX-	PCIe	N.C.
C33	PCIE30_C_RX+	PCIe	N.C.
C34	GND	GND	GND
C35	PCIE30_C_CLK-	PCIe	N.C.
C36	PCIE30_C_CLK+	PCIe	N.C.
C40	PCIE30_C_WAKE#	PCIe	N.C.
C41	GND	GND	GND
C42	PCIE30_D_TX-	PCIe	N.C.
C43	PCIE30_D_TX+	PCIe	N.C.
C44	GND	GND	GND

Table 2.1: AOM-3841 Pin-out			
C45	PCIE30_D_RX-	PCIe	N.C.
C46	PCIE30_D_RX+	PCIe	N.C.
C47	GND	GND	GND
C48	PCIE30_D_RST#	PCIe	N.C.
C49	PCIE30_D_REQ#	PCIe	N.C.
C50	PCIE30_D_WAKE#	PCIe	N.C.
C51	GND	GND	GND
C52	PCIE30_C_CLK-	PCIe	N.C.
C53	PCIE30_C_CLK+	PCIe	N.C.
C54	GND	GND	GND
C55	CSI0_D0-/ CSI00_D0-	CSI	MIPI_DPHY_CSI1_RX_D0N
C56	CSI0_D0+/ CSI00_D0+	CSI	MIPI_DPHY_CSI1_RX_D0P
C57	GND	GND	GND
C58	CSI0_D1-/ CSI00_D1-	CSI	MIPI_DPHY_CSI1_RX_D1N
C59	CSI0_D1+/ CSI00_D1+	CSI	MIPI_DPHY_CSI1_RX_D1P
C60	GND	GND	GND
C61	CSI0_D2-/ CSI01_D0-	CSI	MIPI_DPHY_CSI1_RX_D2N
C62	CSI0_D2+/ CSI01_D0+	CSI	MIPI_DPHY_CSI1_RX_D2P
C63	GND	GND	GND
C64	CSI0_D3-/ CSI01_D1-	CSI	MIPI_DPHY_CSI1_RX_D3N
C65	CSI0_D3+/ CSI01_D1+	CSI	MIPI_DPHY_CSI1_RX_D3P
C66	GND	GND	GND
C67	CSI01_MCK	CSI	MIPI_DPHY_CSI1_CAM1_CLKOUT
C68	GND	GND	GND
C69	CSI02_MCK	CSI	N.C.
C70	GND	GND	GND
C71	CSI0_CK-	CSI	MIPI_DPHY_CSI1_RX_CLKN
C72	CSI0_CK+	CSI	MIPI_DPHY_CSI1_RX_CLKP
C73	GND	GND	GND
C74	CSI01_CK-	CSI	MIPI_DPHY_CSI2_RX_CLKN
C75	CSI01_CK+	CSI	MIPI_DPHY_CSI2_RX_CLKP
C76	GND	GND	GND
C77	CSI0_PWR#	CSI	MIPI_DPHY_CSI1_CAM1_PWREN_H
C78	CSI0_RST#	CSI	MIPI_DPHY_CSI1_CAM1_RST_H
C79	GPIO4/ADC/PWM	GPIO	GPIO4_C5_1V8
C80	GND	GND	GND
C81	HDMI1_TX_CEC/EDP1_AUX-/ DSI1_CLK-/LVDS1_CK-	EDP	MIPI_DPHY_DSI_TX_CLKN
C82	HDMI1_TX_HPD/EDP1_AUX+/ DSI1_CLK+/LVDS1_CK+	EDP	MIPI_DPHY_DSI_TX_CLKP
C83	EDP1_HPD/DP1_HPD/ DSI1_TE	EDP	MIPI_TE_M0
C84	GND	GND	GND
C85	HDMI1_TX_D0-/EDP1_TX0-/ DSI1_D0-/LVDS1_D0-	EDP	MIPI_DPHY_DSI_TX_D0N
C86	HDMI1_TX_D0+/EDP1_TX0+/ DSI1_D0+/LVDS1_D0+	EDP	MIPI_DPHY_DSI_TX_D0P
C87	GND	GND	GND
C88	HDMI1_TX_D1-/EDP1_TX1-/ DSI1_D1-/LVDS1_D1-	EDP	MIPI_DPHY_DSI_TX_D1N
C89	HDMI1_TX_D1+/EDP1_TX1+/ DSI1_D1+/LVDS1_D1+	EDP	MIPI_DPHY_DSI_TX_D1P
C90	GND	GND	GND

Table 2.1: AOM-3841 Pin-out			
C91	HDMI1_TX_D2-/EDP1_TX2-/DSI1_D2-/LVDS1_D2-	EDP	MIPI_DPHY_DSI_TX_D2N
C92	HDMI1_TX_D2+/EDP1_TX2+/DSI1_D2+/LVDS1_D2+	EDP	MIPI_DPHY_DSI_TX_D2P
C93	GND	GND	GND
C94	HDMI1_TX_D3-/EDP1_TX3-/DSI1_D3-/LVDS1_D3-	EDP	MIPI_DPHY_DSI_TX_D3N
C95	HDMI1_TX_D3+/EDP1_TX3+/DSI1_D3+/LVDS1_D3+	EDP	MIPI_DPHY_DSI_TX_D3P
C96	GND	GND	GND
C97	HDMI1_TX_SCL/EDP1_CLK/DSI1_CLK/LVDS1_CLK	EDP	I2C6_SCL_M0_LCD
C98	HDMI1_TX_DAT/EDP1_DAT/DSI1_DAT/LVDS1_DAT	EDP	I2C6_SDA_M0_LCD
C99	EDP1_BKLT_EN/DSI_LCD_B-KLT_EN/LVDS1_BKLT_EN	EDP	EDP1_BKLT_EN
C100	GND	GND	GND
C101	EDP1_VDD_EN/DP1_AUX_- SEL/DSI1_LCD_VDD_ENEDP	EDP	EDP1_VDD_EN
C102	EDP1_BKLT_PWM/DSI1_LC-	EDP	EDP1_BKLT_PWM
C103	GND	GND	GND
C104	SD1_D0	SD	N.C.
C105	SD1_D1	SD	N.C.
C106	SD1_D2	SD	N.C.
C107	SD1_D3	SD	N.C.
C108	SD1_WP	SD	N.C.
C109	SD1_CLK	SD	N.C.
C110	GND	GND	GND
P-Pin	**D Side**	**I/F**	**AOM-3841 pin out**
D1	GND	GND	GND
D2	GND	GND	GND
D3	HDMI0_TX_D0-/EDP0_TX0-/DSI0_D0-/LVDS0_D0-	HDMI	HDMI_TX_D0N/eDP_TX_D0N
D4	HDMI0_TX_D0+/EDP0_TX0+/DSI0_D0+/LVDS0_D0+	HDMI	HDMI_TX_D0P/eDP_TX_D0P
D5	GND	GND?	GND
D6	HDMI0_TX_D1-/EDP0_TX1-/DSI0_D1-/LVDS0_D1-	HDMI	HDMI_TX_D1N/eDP_TX_D1N
D7	HDMI0_TX_D1+/EDP0_TX1+/DSI0_D1+/LVDS0_D1+	HDMI	HDMI_TX_D1P/eDP_TX_D1P
D8	GND	GND	GND
D9	HDMI0_TX_D2-/EDP0_TX2-/DSI0_D2-/LVDS0_D2-	HDMI	HDMI_TX_D2N/eDP_TX_D2N
D10	HDMI0_TX_D2+/EDP0_TX2+/DSI0_D2+/LVDS0_D2+	HDMI	HDMI_TX_D2P/eDP_TX_D2P
D11	GND	GND	GND
D12	HDMI0_TX_CK-/EDP0_TX3-/DSI0_D3-/LVDS0_D3-	HDMI	HDMI_TX_D3N/eDP_TX_D3N
D13	HDMI0_TX_CK+/EDP0_TX3+/DSI0_D3+/LVDS0_D3+	HDMI	HDMI_TX_D3P/eDP_TX_D3P
D14	GND	GND	GND
D15	HDMI_TX_DDC_SCL/ EDP0_I2C_-CLK/DSI0_I2C_CLK	HDMI	HDMI_TX_SCL

Table 2.1: AOM-3841 Pin-out			
D16	HDMI_TX_DDC_SDA/ EDP0_I2C_-DAT/DSI0_I2C_DAT	HDMI	HDMI_TX_SDA
D17	HDMI0_TX_CEC/DP0_AUX_- SEL/DSI0/LVDS_VDD_EN	HDMI	HDMI_TX_CEC_M0
D18	EDP0_BKLT_EN/DSI0_LCD_B-KLT_EN/LVDS_BKLT_EN		N.C.
D19	EDP0_BKLT_PWM/DSI0_BKLT/LVDS_BKLT_PWM		N.C.
D20	HDMI0_TX_HPD/EDP0_HPD/DP0_HPD/DSI0_TE	HDMI	HDMITX_HPDIN_M0
D21	GND	GND	GND
D22	HDMI0_EARC-/EDP0_AUX-/ DSI_-CLK-/LVDS0_CK-	HDM	HDMI_TX_SBDN/eDP_TX_AUXN
D23	HDMI0_EARC+/EDP0_AUX+/DSI_CLK+/LVDS0_CK+	HDMI	HDMI_TX_SBDP/eDP_TX_AUXP
D24	GND	GND	GND
D25	PCIE30_B_TX-	PCIE	N.C.
D26	PCIE30_B_TX+	PCIE	N.C.
D27	GND	GND	GND
D28	PCIE30_B_RST#	PCIE	N.C.
D29	PCIE30_B_REQ#	PCIE	N.C.
D30	PCIE30_B_WAKE#	PCIE	N.C.
D31	GND	GND	GND
D32	PCIE30_B_RX-	PCIE	N.C.
D33	PCIE30_B_RX+	PCIE	N.C.
D34	GND	GND	GND
D35	PCIE30_B_CLK-	PCIE	N.C.
D36	PCIE30_B_CLK+	PCIE	N.C.
D37	GND	GND	GND
D38	PCIE30_A_TX-	PCIE	N.C.
D39	PCIE30_A_TX+	PCIE	N.C.
D40	NULL	N/A	N.C.
D41	GND	GND	GND
D42	PCIE30_A_RX-	PCIE	N.C.
D43	PCIE30_A_RX+	PCIE	N.C.
D44	GND	GND	GND
D45	PCIE30_A_CLK-	PCIE	N.C.
D46	PCIE30_A_CLK+	PCIE	N.C.
D47	GND	GND	GND
D48	PCIE30_A_RST#	PCIE	N.C.
D49	PCIE30_A_REQ#	PCIE	N.C.
D50	PCIE30_A_WAKE#	PCIE	N.C.
D51	GND	GND	GND
D52	CSI1_D0-	CSI	MIPI_DPHY_CSI3_RX_D0N
D53	CSI1_D0+	CSI	MIPI_DPHY_CSI3_RX_D0P
D54	GND	GND	GND
D55	CSI1_D1-	CSI	MIPI_DPHY_CSI3_RX_D1N
D56	CSI1_D1+	CSI	MIPI_DPHY_CSI3_RX_D1P
D57	GND	GND	GND
D58	CSI1_D2-	CSI	MIPI_DPHY_CSI3_RX_D2N
D59	CSI1_D2+	CSI	MIPI_DPHY_CSI3_RX_D2P
D60	GND	GND	GND

Table 2.1: AOM-3841 Pin-out			
D61	CSI1_D3-	CSI	MIPI_DPHY_CSI3_RX_D3N
D62	CSI1_D3+	CSI	MIPI_DPHY_CSI3_RX_D3P
D63	GND	GND	GND
D64	CSI1_PWR#	CSI	MIPI_DPHY_CSI3_CAM3_PWREN
D65	CSI1_RST#	CSI	MIPI_DPHY_CSI3_CAM3_RST_H
D66	GPIO5/ADC/PWM	GPIO	SARADC_VIN4
D67	GND	GND	GND
D68	CSI1_CK-	CSI	MIPI_DPHY_CSI3_RX_CLKN
D69	CSI1_CK+	CSI	MIPI_DPHY_CSI3_RX_CLKP
D70	GND	GND	GND
D71	CSI11_CK-	CSI	MIPI_DPHY_CSI4_RX_CLKN
D72	CSI11_CK+	CSI	MIPI_DPHY_CSI4_RX_CLKP
D73	GND	GND	GND
D74	I2C_CSI0_CLK/CSIO_TX+	CSI	I2C3_SCL_M2_MIPI_CAM2
D75	I2C_CSI0_DATA/CSI0_TX-	CSI	I2C3_SDA_M2_MIPI_CAM2
D76	GND	GND	GND
D77	CSI11_MCK	CSI	MIPI_DPHY_CSI2_CAM2_CLKOUT
D78	GND	GND	GND
D79	CSI12_MCK	CSI	N.C.
D80	GND	GND	GND
D81	I2C_CSI1_CLK/CSI1_TX+	CSI	I2C5_SCL_M3_MIPI_CAM3
D82	I2C_CSI1_DATA/CSI1_TX-	CSI	I2C5_SDA_M3_MIPI_CAM3
D83	NULL	N/A	N.C.
D84	GND	GND	GND
D85	RESERVED	N/A	N.C.
D86	RESERVED	N/A	N.C.
D87	GND	GND	GND
D88	RESERVED	N/A	N.C.
D89	RESERVED	N/A	N.C.
D90	GND	GND	GND
D91	RESERVED	N/A	N.C.
D92	RESERVED	N/A	N.C.
D93	GND	GND	GND
D94	RESERVED	N/A	N.C.
D95	RESERVED	N/A	N.C.
D96	GND	GND	GND
D97	I2S1_MCLK	I2S	SAI3_MCLK_M2
D98	I2S1_LRCLK	I2S	SAI3_LRCK_M2
D99	I2S1_BCLK	I2S	SAI3_SCLK_M2
D100	GND	GND	GND
D101	I2S2_DIN	I2S	SAI3_SDI_M2
D102	I2S1_DOUT	I2S	SAI3_SDO_M2
D103	GND	GND	GND
D104	GPIO6/ADC/PWM	GPIO	SARADC_VIN5
D105	GPIO7/ADC/PWM/RECOVERY	GPIO	FORCE_RECOV#
D106	SD1_VDD_EN	SD	N.C.
D107	SD1_IOPWR	SD	N.C.
D108	SD1_CMD	SD	N.C.
D109	SD1_CD#	SD	N.C.
D110	GND	GND	GND

2.3 Quick Start Guide

2.3.1 Debug Port Connection

1. Connect the debug port cable on AOM-DB3500.
2. Connect it to your PC with a USB to COM Cable.

2.3.2 Debug Port Settings

AOM-3841 can communicate with a host server using serial cables. Common serial communication programs such as HyperTerminal, Tera Term, or PuTTY can be used in this case. The example below describes the serial terminal setup using HyperTerminal on a Windows host:

1. Connect AOM-3841 with your PC using a serial cable.
2. Open HyperTerminal on your Windows PC, and select the settings demonstrated in the photo below.
3. Insert a power adapter into the DC jack and power up the board. The Debug console log will be displayed on the terminal screen.

DEBUG PORT
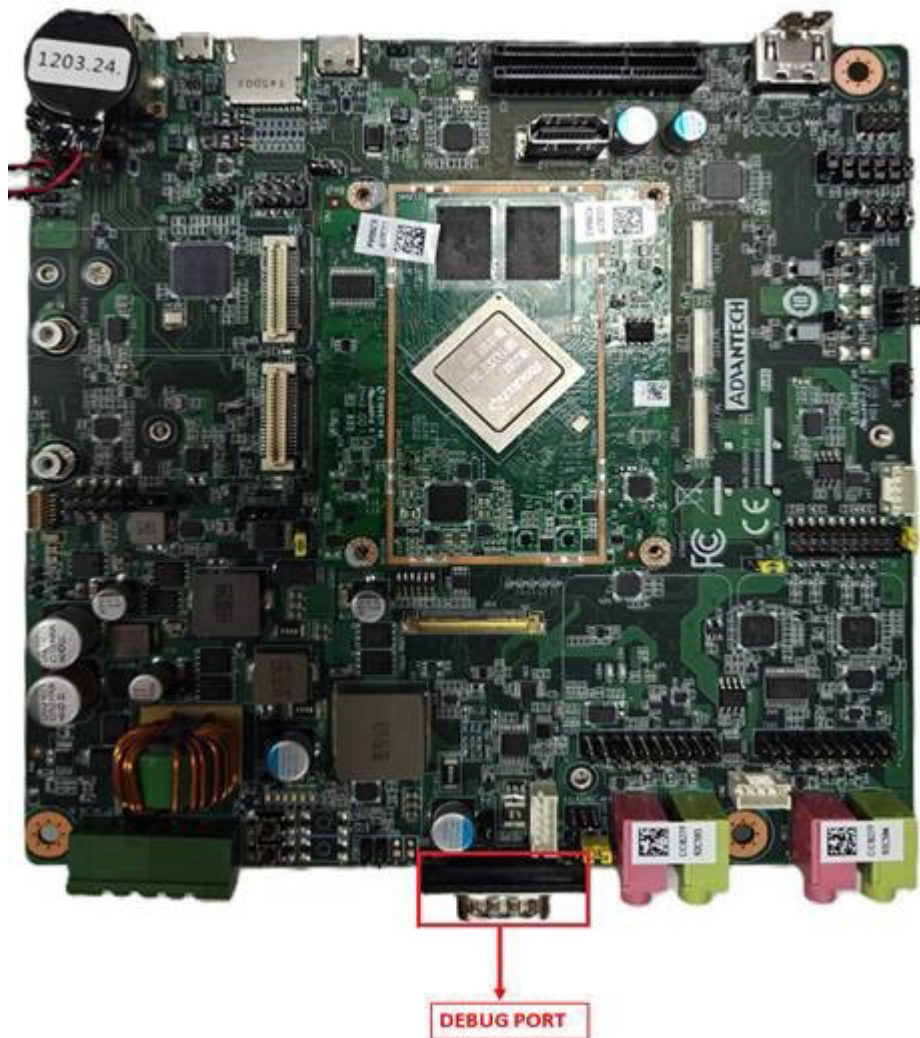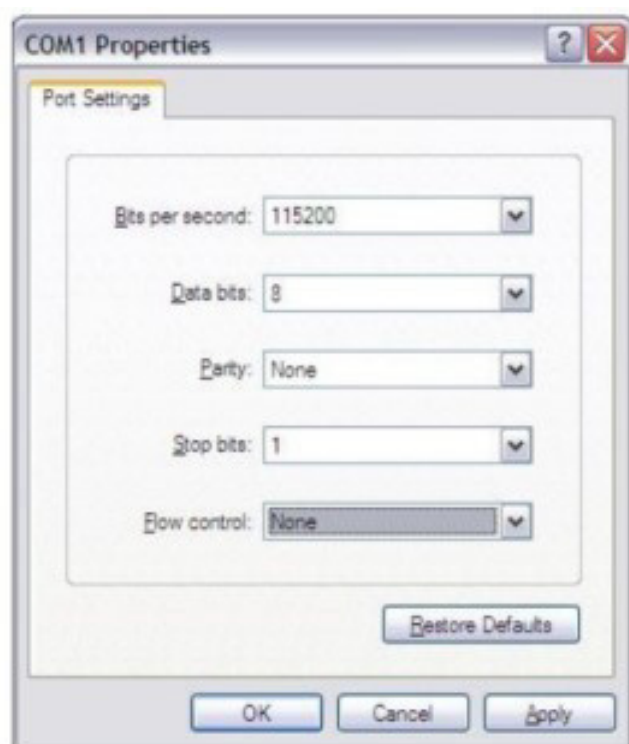
2.3.3 AOM-3841 on AOM-DB3500 Jumper, Switch Settings

When using AOM-3841 with the carrier board AOM-DB3500, please follow the below jumper and switch settings.

Table 2.2: AOM-3841 on AOM-DB3500 Jumper/Switch List	
Connector/Jumper/Switch	Function
CN3	Header for GPIO Test
J28/J26/J25/J27/J31/ J37/J32	GPIO&ADC Selection
J15	EDP Power Selection Header
J16	EDP Inverter Power Selection Header
J12	EDP1 Detect Selection Header
J5/J6	SPI0&SPI1 Selection
J8	M2_E1 Power Selection Header
J10	M.2_B Power Selection Header
J9	UART switch M2_E1&M2_E2
J7/J35/J36	USB2.0 connect to Type A(USB1/2) or MICRO_USB
SW2/SW3	USB0_OTG&USB0_Host power en & oc Selection
SW1	Mode setting
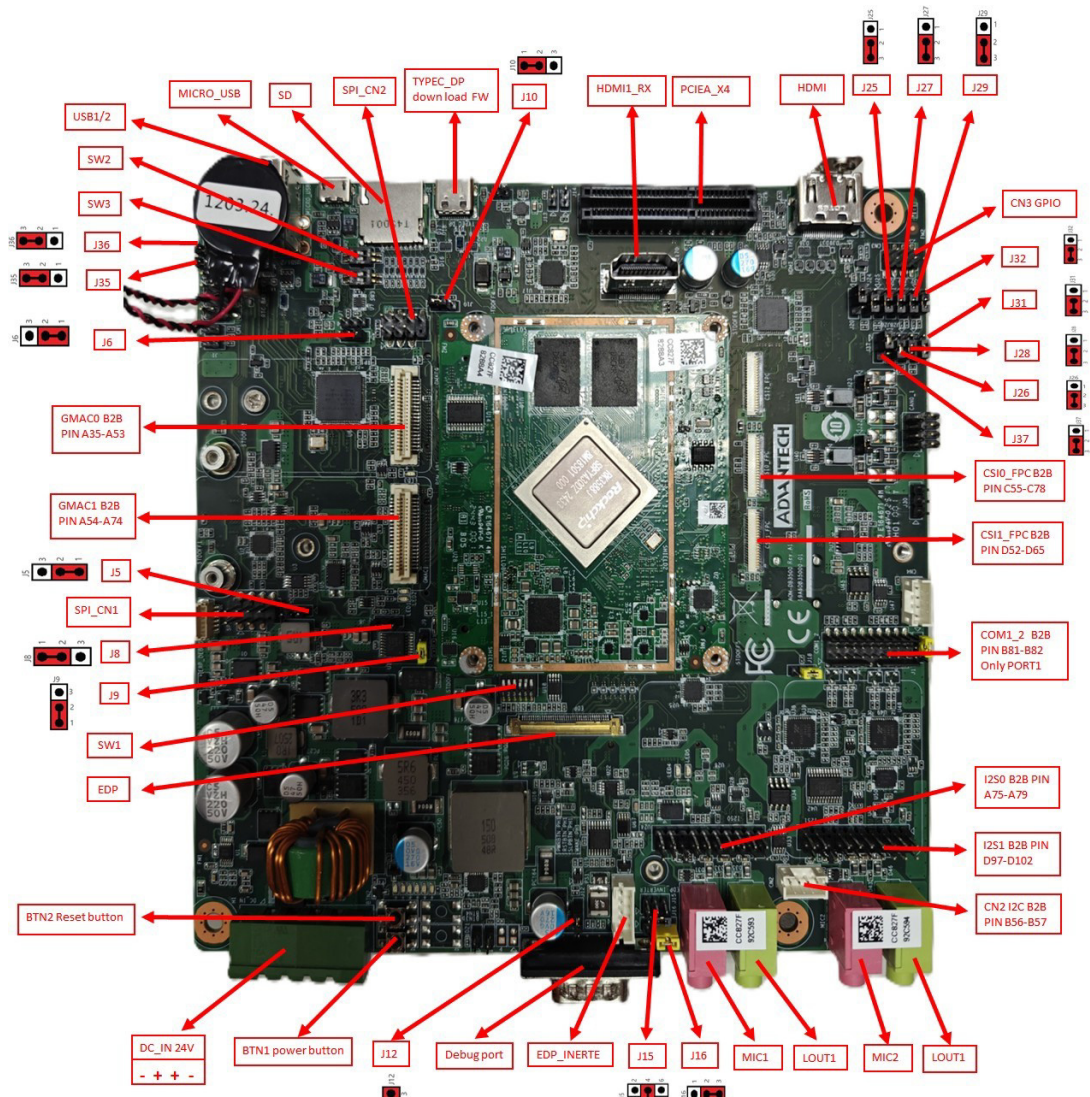
Figure 2.2 AOM-3841&AOM-DB3500 Top View
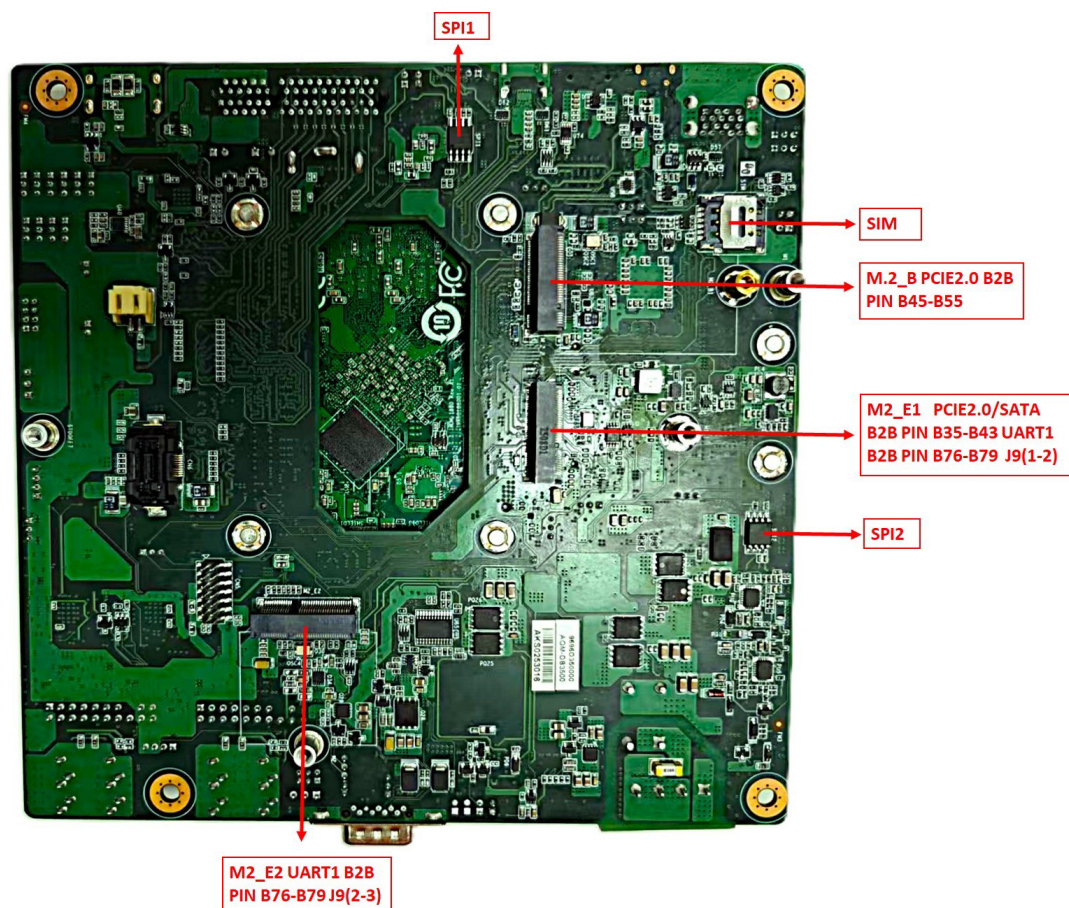
Figure 2.3 AOM-3841&AOM-DB3500 Bottom View

2.3.3.1 GPIO Header and Selection

Table 2.3: CN3 GPIO Headers			
Pin	**Signal**	**Pin**	**Signal**
1	+V1.8	2	GND
3	GPIO0_Z_G	4	GPIO4_G
5	GPIO1_Z_G	6	GPIO5_G
7	GPIO7_G	8	GPIO6_G
9	NC	10	GPIO3_PH

Table 2.4: J28 GPIO0 Headers	
Pin	**Function**
J28 (1-2)	ADC (AOM-3841 not support)
J28 (2-3)	GPIO0 to J26 (Default)

1
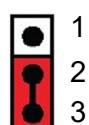
Table 2.5: J26 GPIO0 Selection

Pin	Function
J26 (1-2)	GPIO0 to CN3
J26 (2-3)	GPIO0 to TYPEC_Z_SBU1 (Default)
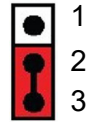
Table 2.6: J25 GPIO1 Selection

Pin	Function
J25 (1-2)	ADC (AOM-3841 not support)
J25 (2-3)	GPIO1 to J27 (Default)

Table 2.7: J27 GPIO1 Selection

Pin	Function
J27 (1-2)	GPIO1 to CN3
J27 (2-3)	GPIO1 to TYPEC_Z_SBU2 (Default)
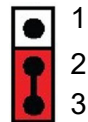
Table 2.8: J31 GPIO4 Selection

Pin	Function
J31 (2-3)	GPIO4 to J37 (Default)
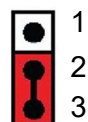
Table 2.9: J37 GPIO4 Selection

Pin	Function
J37(1-2)	GPIO4 to CN3 (Default)
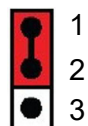
Table 2.10: J32 ADC1 Selection

Pin	Function
J32 (2-3)	ADC1 (Default)
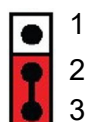
Table 2.11: J29 ADC2 Selection

Pin	Function
J29 (2-3)	ADC2 (Default)
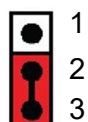
2.3.3.2 J15 EDP Power Selection

Table 2.12: J15 EDP Power Selection

Pin	Function
J15 (1-3)	+VDD_EDP 5V
J15 (3-5)	+VDD_EDP 3.3V (Default)
J15 (3-4)	+VDD_EDP 12V (edp B156XTN07.1)

2.3.3.3 J16 Inverter Power Selection

Table 2.13: J16 Inverter Power Selection	
Pin	**Function**
J16 (1-2)	EDP Inverter PWR 5V
J16 (2-3)	EDP Inverter PWR 12V (Default)

```
┌─┐
│●│ 1
├─┤
│●│ 2
│●│ 3
└─┘
```
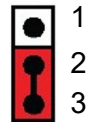
2.3.3.4 J12 EDP Inverter Power Selection

Table 2.14: J12 EDP Inverter Power Selection	
Pin	**Function**
J12 (1-2)	LVDS&DSI (AOM-3841 not support)
J12 (2-3)	EDP HDP

```
┌─┐
│●│ 1
├─┤
│●│ 2
│●│ 3
└─┘
```
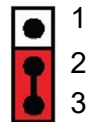
2.3.3.5 SPI1 Jumper Setting

Table 2.15: SPI1 Jumper Setting	
Pin	**Function**
J6 (1-2)	SPI0 to SPI1 flash (Default)
J6 (2-3)	SPI0 to SPI_CN2

```
┌─┐
│●│ 1
│●│ 2
├─┤
│●│ 3
└─┘
```
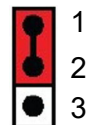
2.3.3.6 SPI1 J5 Jumper Setting

Table 2.16: SPI1 J5 Jumper Setting	
Pin	**Function**
J5 (1-2)	SPI1 to SPI1 flash (Default)
J5 (2-3)	SPI1 to SPI_CN1

```
┌─┐
│●│ 1
│●│ 2
├─┤
│●│ 3
└─┘
```
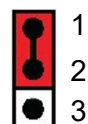
2.3.3.7 J8 M2_E1 Power Setting

Table 2.17: J8 M2_E1 Power Setting	
Pin	Function
J8 (1-2)	M2_E1 power 3.3V (Default)
J8 (2-3)	M2_E1 power 3.8V

1
2
3
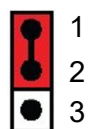
2.3.3.8 J10 M.2_B Power Setting

Table 2.18: J10 M.2_B Power Setting	
Pin	Function
J10 (1-2)	M.2_B power 3.3V (Default)
J10 (2-3)	M.2_B power 3.8V

1
2
3
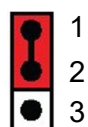
2.3.3.9 J9 M.2_B Power Setting

Table 2.19: J9 M.2_B Power Setting	
Pin	Function
J9 (1-2)	(B2B pin B76-B79) to M2_E1 (Default)
J9 (2-3)	UART1 (B2B pin B76-B79) to M2_E2

2.3.3.10 SW2 &SW3 USB0_OTG& USB0_HOST power &OS Setting

Table 2.20: SW2 &SW3			
Dip Switch	1-4	2-3	Function
SW2	ON	OFF	USB0_OTG_PWR_EN control USB1/2 +USBV1 power,SW3 Need SW3(1-4 OFF,2-3 ON)
SW2	OFF	ON	USB0_HOST_PWR_EN control USB1/2 +USBV1 power Need SW3(1-4 ON,2-3 OFF)
SW3	ON	OFF	USB0_HOST_OC#, Need SW2(1-4 OFF, 2-3 ON)
SW3	OFF	ON	USB0_OTG_OC#

SW2

2 | 3
1 | 4

CHS-02TB(20)

SW3

2 | 3
1 | 4

CHS-02TB(20)
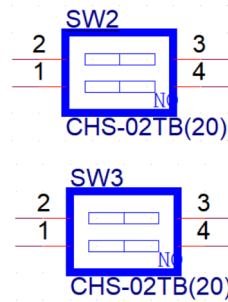
2.3.3.11 J7, J35, J36 USB0 & USB0_OTG Setting

Table 2.21: J7, J35, J36 USB0 & USB0_OTG Setting

Pin	Function
J7 (Nojumper)J35 (2-3)	USB0_OTG (B2B A32-A33) to USB1/2
J7(No jumper)J36(2-3)	USB0 Host to MICRO_USB

J35   J36
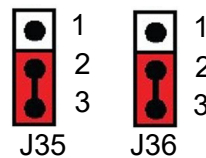
2.3.3.12 SW1 Setting

Table 2.22: SW1 Setting

Switch	Function
1-12/2-11/3-10/6-7	No function for AOM-3841 + AOM-DB3500
4-9(Default Off)	When the eMMC has an OS, AOM-3841 can start up and enter the OS normally. When there is no OS in the eMMC of the AOM-3841, it enters MASKROM mode. You can burn the OS into the eMMC through the TYPEC_DP of the AOM-DB3500. Switch to ON; regardless of whether there is an OS in the eMMC of the AOM-3841, the board will enter MASKROM mode. You have to switch it to off, and then burn the OS into the eMMC through the TYPEC_DP of AOM-DB3500.
5-8 ON	Recovery mode

EHS 1 06 LD XX
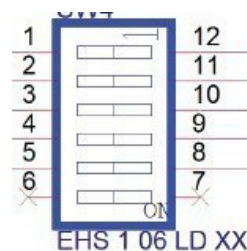
Chapter 3

Software Functionality

This chapter details the software programs on the AOM-3841.

3.1 Preface

All test tools must be verified using the AOM-3841 evaluation kit (Develop. Board AOM-DB3500). Please prepare the required test fixtures before verifying each specified I/O. If you have any problems during testing, please contact Advantech for help.

Table 3.1: Preface

Support List	Description	Part No.
Audio	ALC5640-VB-CGT Audio Codec	9696EG57001
LAN	RTL8211FS-CG LAN Board	9696EG6A000
5G	RM520NGLAA-M20-SGASA (M.2 KeyB) USB3.1/PCIE3.0	968DD00342
WIFI6	Broadcom AP6275P, (M.2 E Key)-40 °C~85 °C PCIE+UART	AIW-162BS-GI1
Camera	MIPI Camera IMX415	ROM-EC50+ CRK8F4403-V1
SPI/I2C	SPI/I2C Board	9696EG70000
eDP Panel	B156XTN07.1,1366 x 768, AUO	XUTC-B156XTN07.1

3.2 Command Introduction

All the commands in this document should be input after the operating system boots up and under "root" user if no special notice.

The terminal may look like the following tip.

```
root@linaro-alip:/#
```

If the user is not "root", use the following command to change to "root"

```
linaro@linaro-alip:/$
linaro@linaro-alip:/$
sudo su root root@linaro-alip:/#
```

3.2.1 Command Format

1. Commands in single line start with "#":

```
# command
```

Copy and run commands without "#"

2. Commands in multi-lines:

First line starts with "#" and ends with "\".

Next line starts with "" and ends with "\".

Last line starts with "" and ends with "".

```
# command1 \
command2 \
command3 \
command4
```

Copy and run multi-line commands without "#" simultaneously.

3. Annotations in single line start with "# #----" and end with "# #":

```
# #---- annotations# #
```

3.3 Debian Desktop Operating System

AOM-3841 is embedded Debian Desktop operating system. It can be easily used.

3.3.1 User and Password

AOM-3841 has two users: root/linaro and their passwords are "123456" by default.

After the Debian Desktop system boots up, it will automatically log in to the "linaro" user.
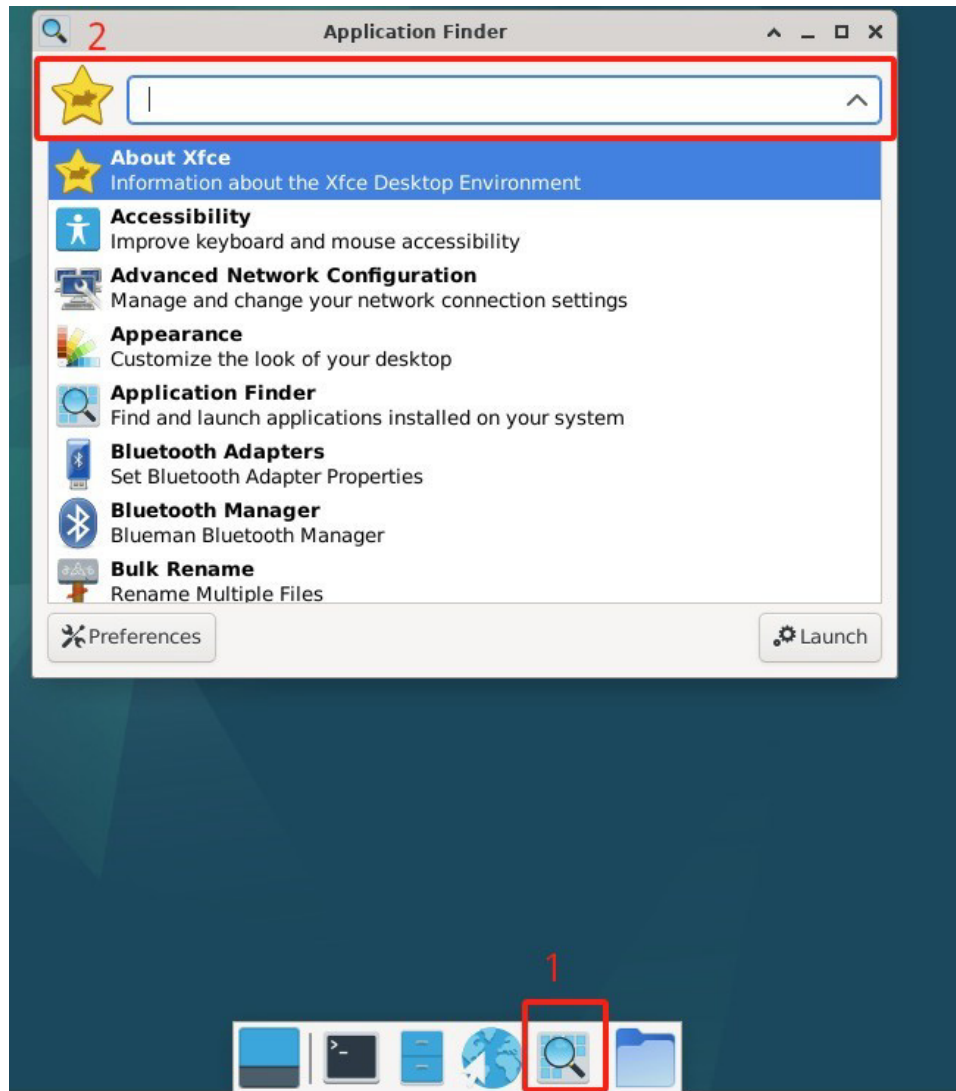
If there is a debugging serial port connected, the serial terminal automatically logs in to the "root" user.

3.3.2 Find Application

1. You can find an application in "Applications".
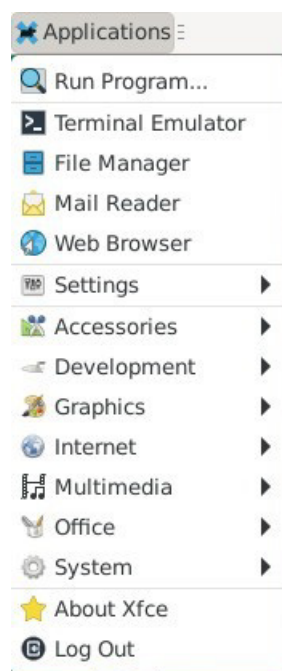
2. Alternatively, you can search for it in the "Application Finder" list.

3.4   HDMI/DP Screen

HDMI and DP support multi resolutions. They can be configured by GUI. HDMI and DP support 4K60Hz display.

3.4.1   Configure Resolution for HDMI/DP Screen

1. Click "Applications" -> "Settings"->"Display".
2. Choose "HDMI-1"or "DP-1", then choose "Resolution".
3. Click "Apply".
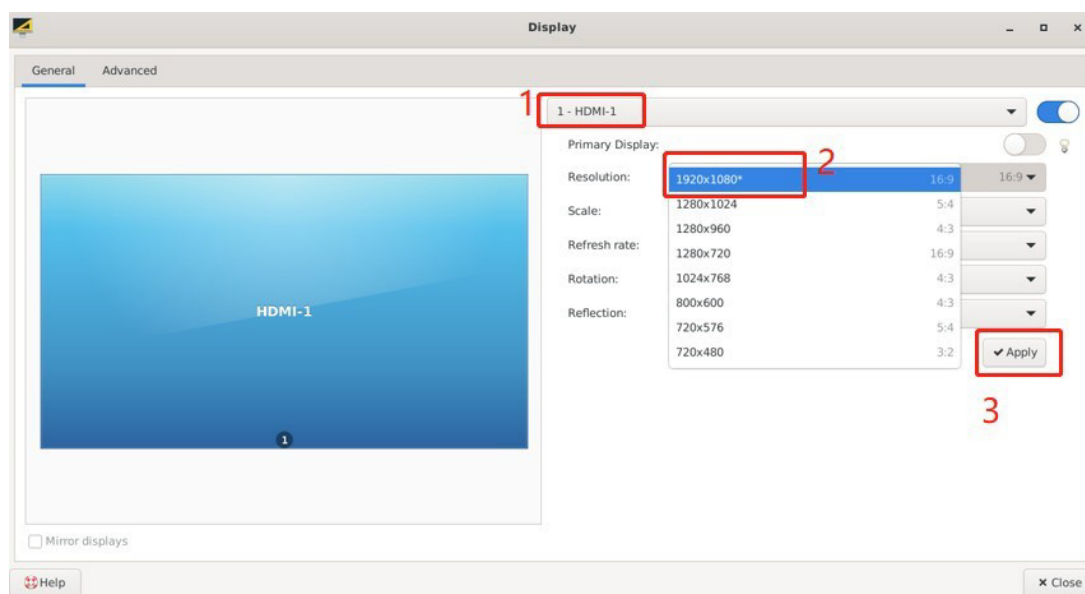
3.5   Multi-Display

AOM-3841 supports three kinds of displays — HDMI, DSI, DP.

> *Note!*   1.   *DP physical interface is Type-C.*
>
> 2.   *DP is always open and cannot be closed.*

3.5.1   Dual-Display

"HDMI + DP" is the default configuration.

■   HDMI + DP

```
# fw_setenv display0 hdmi0-default
# fw_setenv display1
# reboot
```

■   DSI + DP

```
# fw_setenv display0
# fw_setenv display1 mipi0-gl0uan
# reboot
```

3.5.2 Triple-Display

- HDMI + DSI + DP

```
# fw_setenv display0 hdmi0-default
# fw_setenv display1 mipi0-gl0uan
# reboot
```

3.6 Audio

AOM-3841 supports three kinds of sound cards:

"1 rt5640-codec"(9696EG57001)

"2 hdmi",

"3 dp0".

Set the default audio output when playing media files.

1. Click "Applications" ->"Multimedia"->"PulseAudio Volume Control".
2. Select "Build-in Audio stereo" for rt5640-codec output, or select "HDMI" for HDMI output, or select "Build-in Audio Display Port 1 Stereo" for DP output.
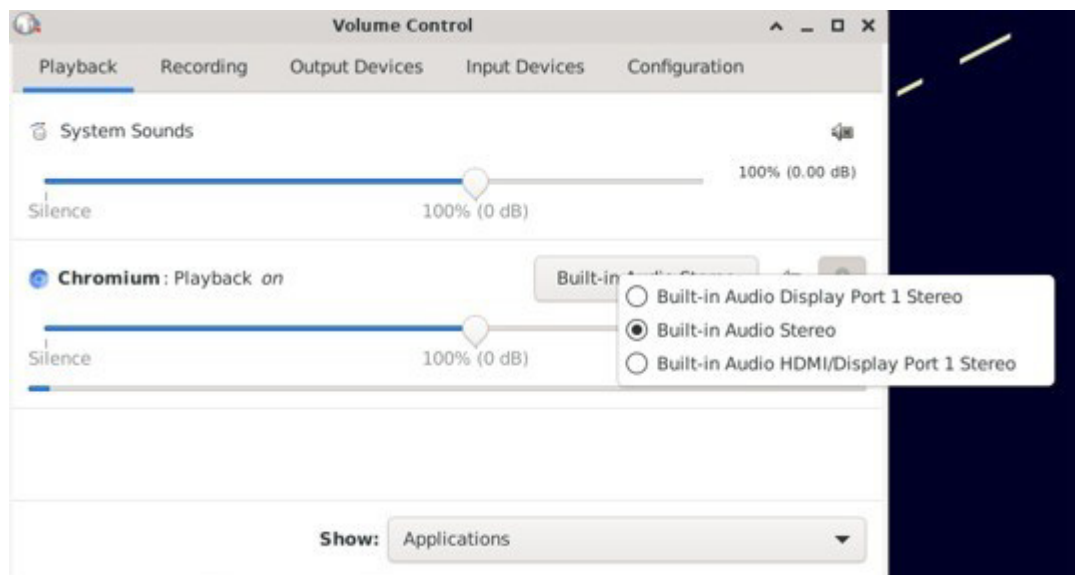
3.6.1 Mute and Volume control

Mute and volume can be configured by GUI.
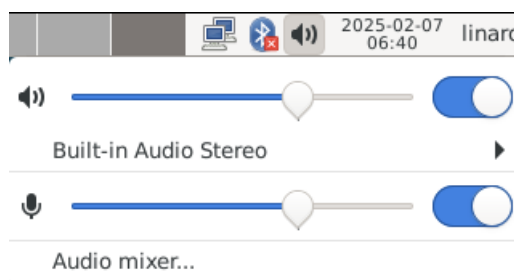
3.6.2 Audio Test

1. Get sound card ID.

```
# cat /proc/asound/cards
0 [rockchiprt5640c]: simple-card - rockchip,rt5640-codec
                     rockchip,rt5640-codec
1 [rockchipdp0    ]: rockchip-dp0 - rockchip-dp0
                     rockchip-dp0
2 [rockchiphdmi   ]: rockchip-hdmi - rockchip-hdmi
                     rockchip-hdmi
```

2. Record.
   Take Card ID 0 for example:

```
# CARD_ID=0
# arecord -c 2 -Dplughw:$CARD_ID,0 -f S16_LE -r 16000 -d 10 -t wav
test.wav
```

3. Playback.
   Take Card ID 0 for example:

```
# CARD_ID=0
# aplay -Dplughw: :$CARD_ID,0 -t wav test.wav
```

See details of the usage of "aplay":

```
# aplay --help
… …
-D, --device=NAME        select PCM by name
-t, --file-type TYPE     file type (voc, wav, raw or au)
… …
```

3.7 5G

AOM-3841 supports RM520NGLAA.

3.7.1 Configure 5G

1. Power off the device, then insert 5G module and SIM card.

> **Note!** *Make sure the device is power off before insert 4G/5G module and SIM card, otherwise the device, 4G/5G module and/or SIM card may be damaged.*

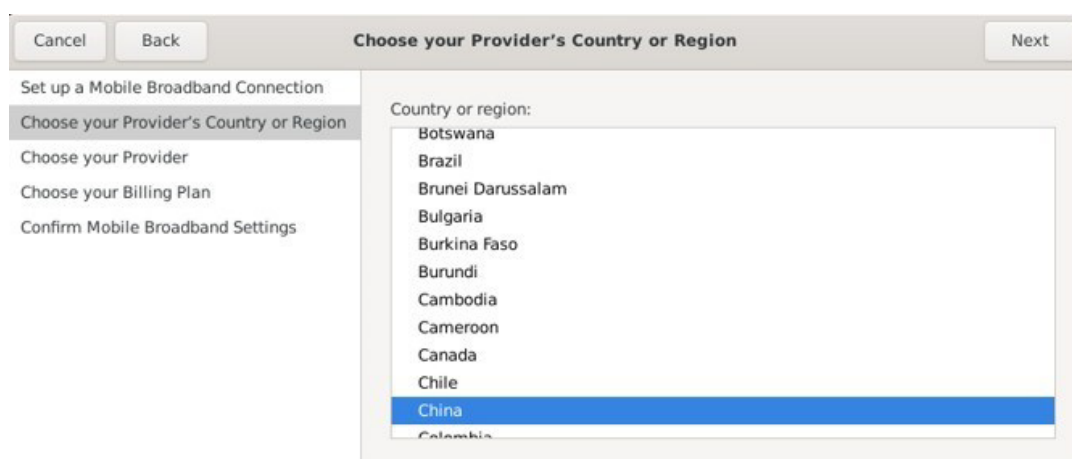2. Power on the device, Click network connection icon
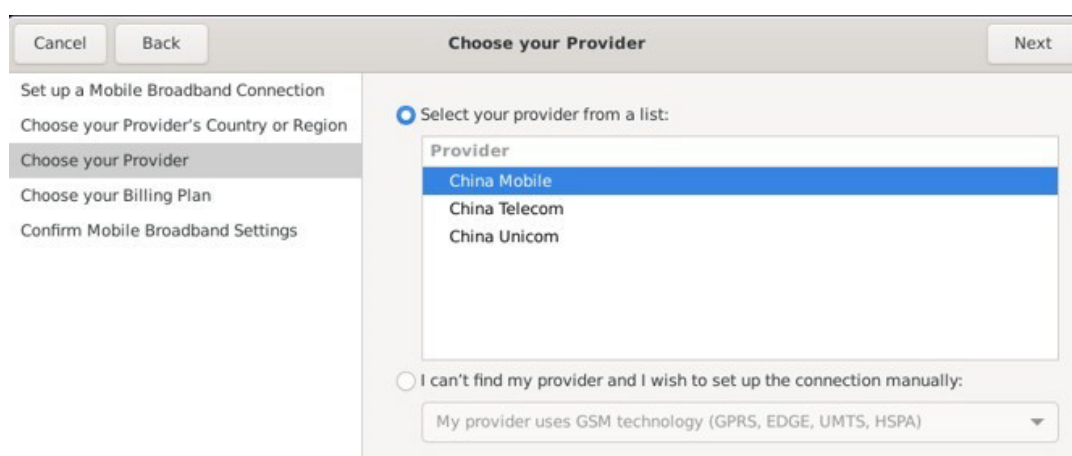

Then choose "New Mobile Broadband connection".
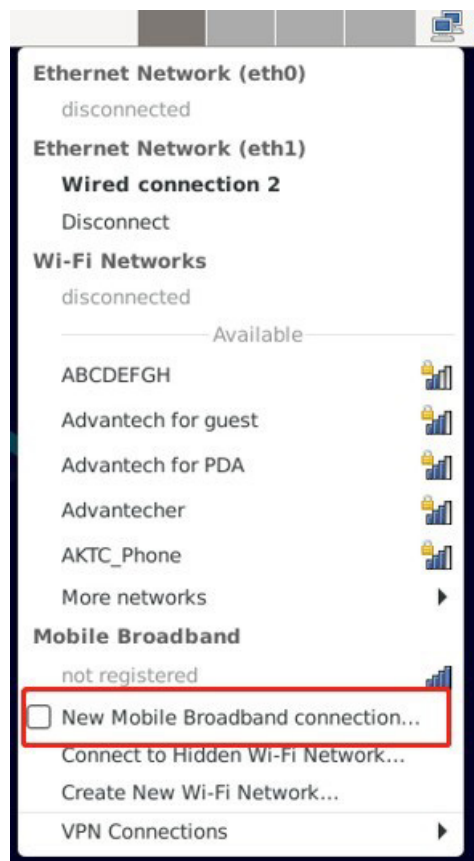
Then you will see the following window, click "Next" button to the next step.
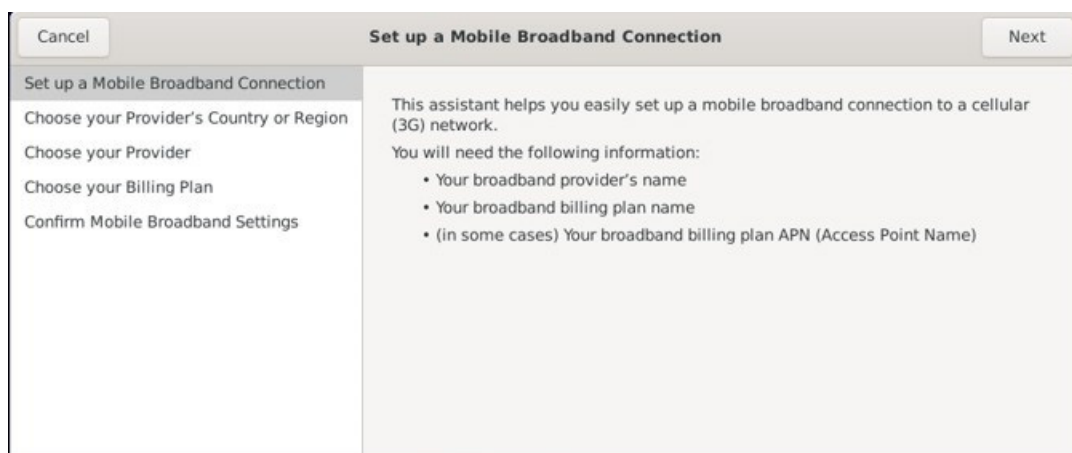
3.   Choose Provider's country or region of the SIM card you insert in STEP0.

4.   Choose or Set the Provider's name.

5. Choose or Set APN.

6. Confirm your config and finish.

3.7.2   5G Test

After connection, 5G will create a net point "wwan0".

```
# ping -I wwan0 www.advantech.com
```

3.8   WIFI/BT

AOM-3841 supports AIW-162BS-GI1.

3.8.1   Configure WIFI

1.   Click the network icon in the top right corner of the screen and click the line of "Available networks" to select a Wi-Fi connection (for example, Advantech for guest).
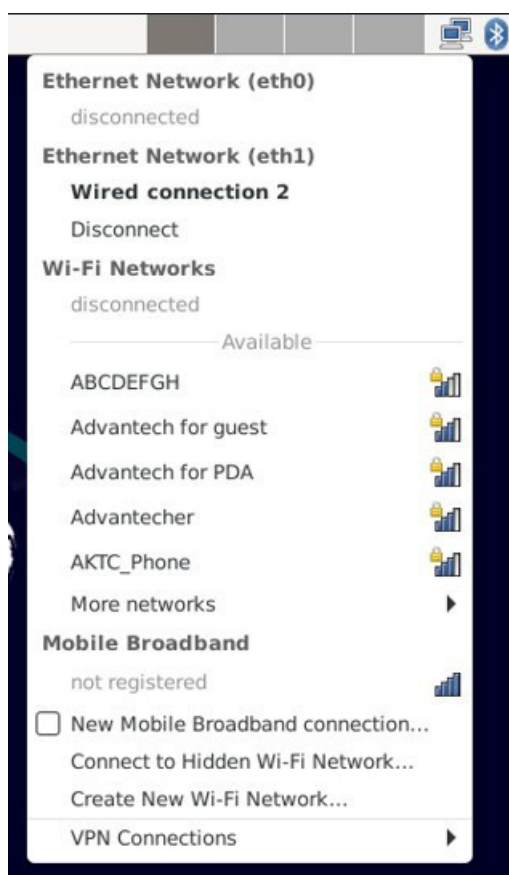
2.   Enter the Wi-Fi password to connect to the device.

3. If the password is correct, the device will connect quickly.

3.8.2 WIFI Test

After connection, Wi-Fi will create a net point "wlan0".

```
# ping -I wwan0 www.advantech.com
```

3.8.3 BT

1. Click "Applications" -> "Settings"-> "Bluetooth manager". Click the "Search" button to search for Bluetooth devices.
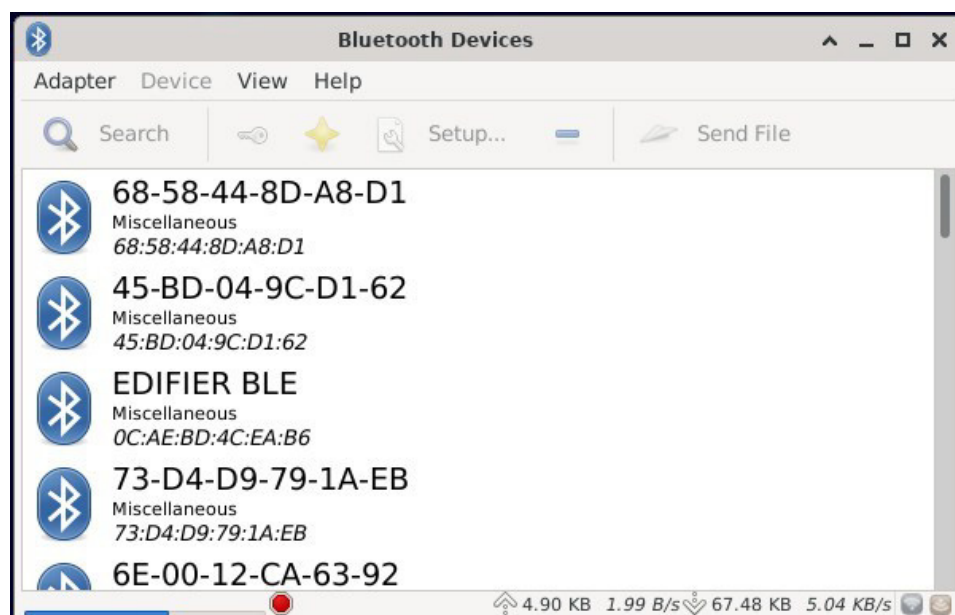
2.   Right-click to select a device, such as "jt-TianYi510Pro-14IMB", and send a file.
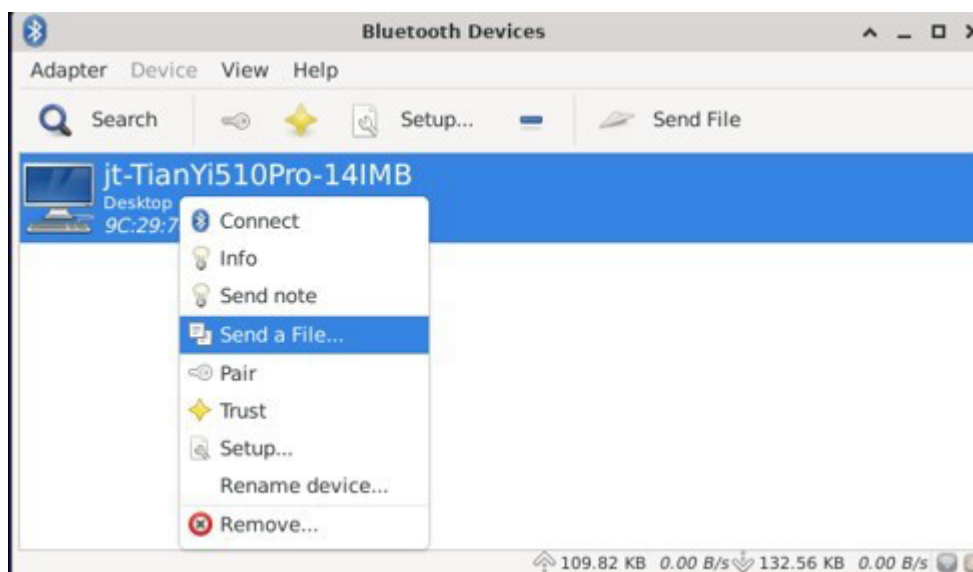
3.   AOM-3841 will start sending files when the receiver device, such as "jt-TianYi510Pro-14IMB", confirms bluetooth reception.
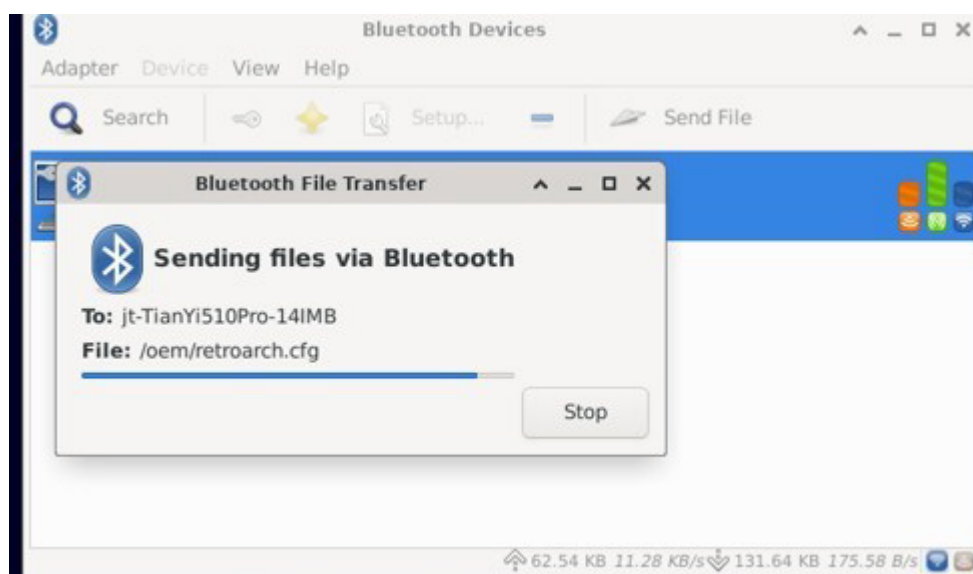
3.9 Ethernet

AOM-3841 supports two Ethernet ports (via 9696EG6A000): eth0/eth1. All ports are using the "DHCP" mode by default. The following configurations and tests are taking eth0 as an example.

3.9.1 Configure to Static IP

1. Click "Applications" -> "Settings" -> "Advanced Network Configration".

2. Double-click "Wired Connection 1" to configure it.

3.9.2 Configure to DHCP

1. Click "Applications" -> "Settings -> "Advanced Network Configuration".
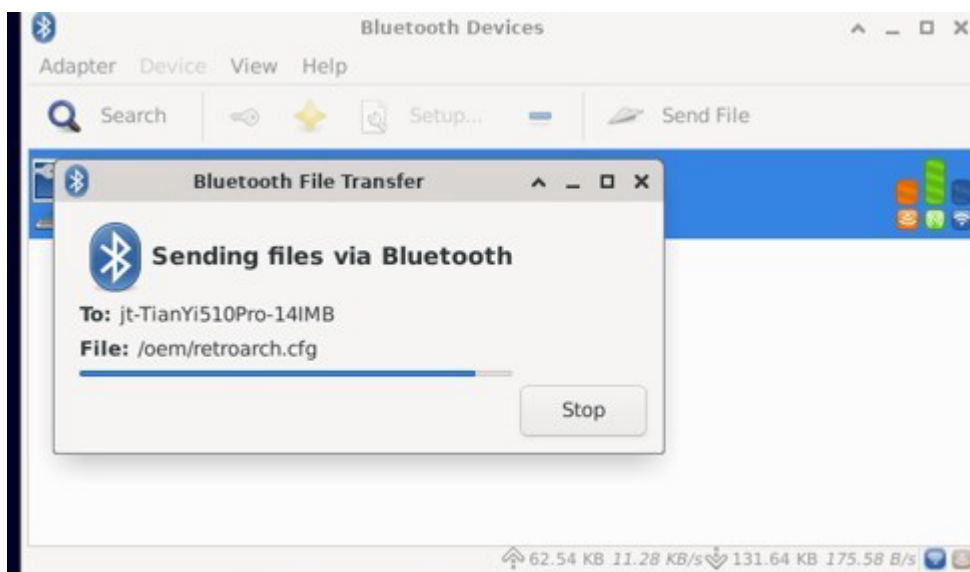
2. Double-click "Wired Connection 1" to configure it.
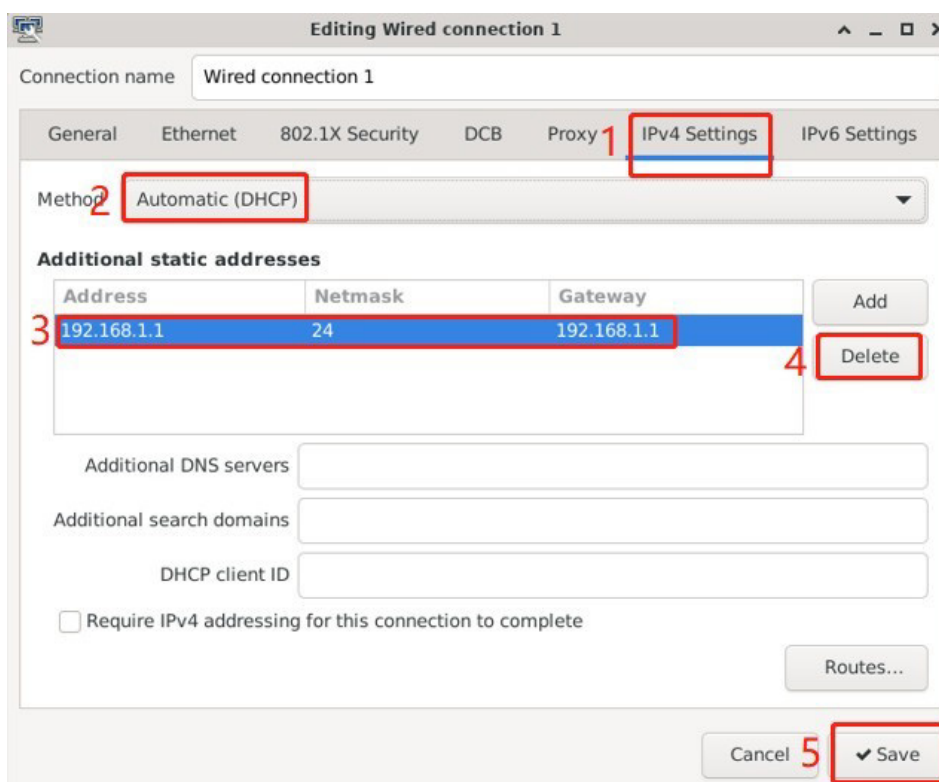
3.9.3 Ethernet Test

After connection, Ethernet will create a net point "eth0","eth1".

```
# #---- Test eth0 ----# #
# ping -I eth0 www.advantech.com

# #---- Test eth1 ----# #
# ping -I eth1 www.advantech.com
```

3.10 UART

User Debian/Linux UART/serial port access is through the tty-devices. The tty-devices have different names depending on UART drivers for different boards.

Table 3.2: UART	
Device Node	**COM Port Name**
/dev/ttyFIQ0	Debug
/dev/ttyS2	COM1(RS232 2-wire)
/dev/ttyS4	COM2(RS232 4-wire)
/dev/ttyS10	M.2_E1(UART)

3.10.1 Configure Parameters

Use "stty" command to configure serial port parameters. The commonly used parameters include "Baud rate", "Data bits", "Stop bits", "Parity", "Flow control".

See details of the usage of "stty":

```
# stty --help
… …
csNset character size to N bits, N in [5..8]
[-]cstopbuse two stop bits per character (one with '-')
[-]parenbgenerate parity bit in output and expect parity bit in
input [-]crtsctsenable RTS/CTS handshaking
… …
```

For example, set COM1
"Baud rate" to 115200
"Data bits" to 8
"Stop bits" to 1
"Parity" to None
"Flow control" to None

```
# stty -F /dev/ttyS0 115200 cs8 -parenb -cstopb
```

3.10.2 Send and Receive Data

Taking COM1 as receiver or sender (An external COM is required to do the sending or receiving). For example, AOM-3841 is responsible for receiving and inputting instructions. The PC computer is connected via a cable and COM1. The PC computer uses the PuTTY serial port tool, opens the COM port, configures the baud rate to 115200, data bits to 8, stop bits to 1, parity to none, flow control to none, and sends "pass" to the serial port assistant. If no error, the external COM receiver will receive "pass".

```
# #---- COM1 as receiver ----# #
# stty -F /dev/ttyS0 115200 cs8 -cstopb -parenb # cat /dev/ttyS0 &
```

```
# #---- COM1 as sender ----# #
# stty -F /dev/ttyS0 115200 cs8 -cstopb -parenb # echo pass > /dev/
ttyS0

# #----If no error, the external COM receiver will receive "pass"---
-# # pass
```

> *Note!*
> 1. *Receiver should run before sender.*
> 2. *The "serial port parameters" should be the same for sender and receiver.*

3.11 GPIO

The RK3576 bank/bit notation for GPIOs must be formed as
"GPIO<GPIO_bank>_<gpio_bit>"
The numeric value of GPIO is calculated as follows:
32 x (gpio_bank) + gpio_bit
gpio_bit: A0~A7 0-7 B0~B7 8-15 C0~C7 16-23 D0~D7 24-31
E.g. GPIO0_B5 becomes 13

Table 3.3: GPIO

GPIO Number	GPIO formed	Numeric Representation
GPIO3	GPIO0_B0	8
GPIO4	GPIO4_C5	149

The remaining GPIOs marked on the test board have been used as other functional pins and cannot be set as GPIOs. Just provide the testing method for GPIO3.
Export GPIO then you can use control GPIO from user space through sysfs.

■ Export GPIO

```
# echo 54 > /sys/class/gpio/export
```

■ Set GPIO direction to in/out

```
# echo "out" > /sys/class/gpio/gpio54/direction
```

■ Set GPIO value 0/1 if GPIO pin define is output

```
# echo 1 > /sys/class/gpio/gpio54/value
```

■ Unexport GPIO

```
# echo 54 > /sys/class/gpio/export
```

3.12 RTC

Set the system to the current time then set the RTC.

```
# date 021710452016 && hwclock -w && date
Wed Feb 17 10:45:00 UTC 2016
Wed Feb 17 10:45:01 UTC 2016
```

Set one incorrect time, then read RTC to verify.

```
# date 010100002000 && hwclock -r && date
Sat Jan1 12:00:00 AM UTC 2000
2016-02-17 10:45:14.178208+00:00
Sat Jan1 12:00:00 AM UTC 2000
```

Restore the RTC time to system time.

```
# hwclock -s && date
Wed Feb 17 10:45:30 AM UTC 2016
```

3.13 Watchdog

A Watchdog Timer (WDT) is a hardware circuit that can reset the computer system in case of a software fault.

AOM-3841 supports one external watchdog.

The default value of timeout is 60 seconds, and it can be set from 1 second to 65535 seconds.

3.13.1 Check Watchdog device

List watchdog device.

```
# ls /dev/watchdog
/dev/watchdog
```

3.13.2 Usage

Here are two ways to use watchdog:

1. Use "echo" command.
   Writing any character except the specific magic character 'V' will open the watchdog, and write once before the timeout (60 seconds by default) passes, otherwise the system will reboot.

```
# echo A > /dev/watchdog
```

Writing the specific magic character 'V' to stop the watchdog.cc.

```
# echo V > /dev/watchdog
```

2. Write a program using "ioctl".
   See more details in [BSP]/kernel/Documentation/watchdog/watchdog-api.rst.

3.14 PCIE

AOM-3841 supports three PCIE ports.

Using the PCIE disk (SQF-C8BV2-128G-EDE) to test the M.2_B-Key PCIE interface.
Using the WIFI module (AIW-162BS) to test the M.2_E-Key PCIE interface.

3.14.1 PCIE Mode Switch

PCIE and SATA are alternative, M.2 Interface commands for setting PCIe mode.

1. M.2_E-KEY PCIe Mode.

```
# fw_setenv combphy0 pcie
# reboot
```

2. M.2_B-KEY PCIe Mode.

```
# fw_setenv combphy1 pcie
# reboot
```

3.14.2 PCIE Test

M.2_B-KEY PCIE TEST Preparation:

1. Insert PCIE disk.

> *Note!* 1. *Make sure the device is power off before insert PCIE disk, other-*
> *wise the device and/or PCIE disk may be damaged.*
> 2. *Make sure PCIE disk is partitioned and formatted.*

2. List disk information.

```
# fdisk -l /dev/nvme0n1
Disk /dev/nvme0n1: 119.24 GiB, 128035676160 bytes, 250069680 sectors
Disk model: SQF-C8BV2-128G-EDE
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes I/O size (min-
imum/optimal): 512 bytes / 512 bytes Disklabel type: dos
Disk identifier: 0x217a69bc
```

3. Check mount point.

```
# mount | grep nvme
/dev/nvme0n1p1 on /run/media/nvme0n1p1 type ext4 (rw,relatime)
```

4. Speed Test.
   Read Speed.

```
# echo 3 > /proc/sys/vm/drop_caches
# dd if=/dev/nvme0n1 of=/dev/zero bs=1M count=400 400+0 records in
400+0 records out
419430400 bytes (419 MB, 400 MiB) copied, 0.728982 s, 575 MB/s
```

5. Write Speed.

```
# echo 3 > /proc/sys/vm/drop_caches
# dd if=/dev/zero of=/dev/nvme0n1 bs=1M count=400 400+0 records in
400+0 records out
419430400 bytes (419 MB, 400 MiB) copied, 0.915896 s, 458 MB/s
```

M.2_E-KEY PCIE TEST:

■ Please refer to Section 3.8 for the connection of the WIFI module AIW-162BS. If the WIFI function works properly, it indicates that the PCIE function is normal and in use.

3.15 SATA

AOM-3841 supports 1 x PCIe 2.1/SATA 3.1, 1 x PCIe 2.1/SATA 3.1/USB3.1, you can set SATA by SW Configuration.

1. M.2_E-KEY SATA Mode.

```
# fw_setenv combphy0 sata
# reboot
```

2. M.2_B-KEY SATA Mode.

```
# fw_setenv combphy1 sata
# reboot
```

3.16 I^{2}C PIN Header

AOM-3841 has two I2C-PIN-Header channels.

Table 3.4: I2C-PIN-Header

I^{2}C Number	Bus Number	I2C Address	AOM-DB3500 Number
I2C0	0	0x53	CN2
I2C1	7	0x53	CN4

Using ROM-EG70 Test Board to read I2C flash. Using I2C0 as an example:

```
# i2cdetect -y 0
0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:                         -- -- -- -- 0c -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- UU -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- 53 -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- 71 -- -- -- -- -- --
# i2ctransfer -y 0 w4@0x53 0x1f 0xf0 0x22 0x33
# i2ctransfer -y 0 w2@0x53 0x1f 0xf0 r2
0x22 0x33
```

3.17 SPI PIN Header

AOM-3841 has two SPI-PIN-Header channels. SPIs on AOM-DB3500 have multi-functions, change to SPI PIN Header.

Using ROM-EG70 Test Board to read SPI flash. Test one SPI port alternatively:

```
# cat /proc/mtd | grep –c mtd0
1
```

Test two SPI ports at the same time:

```
# cat /proc/mtd | grep -c mtd1
1
```

3.18 Camera

AOM-3841 has three MIPI-CSI camera ports.

Table 3.5: MIPI-CSI camera ports			
Camera Number	Video Port	Note	AOM-DB3500 Number
Camera 1	42	(I2C 3) 4 Lane	CSI0_FPC
Camera 2	51	(I2C 5) 4 Lane	CSI1_FPC
Camera 3	33	(I2C 4) 4 Lane	CSI2_FPC

3.18.1 View Resolution

Taking port 42 as an example, you can enter the following instructions to view information such as the resolution, pixel format, Field, Number of planes, Flags, Colorspace, Transfer Function, YCbCr/HSV Encoding, Quantization, Bytes per Line and Size Image.

```
# v4l2-ctl -d /dev/video42 --get-fmt-video
Format Video Capture Multiplanar:
        Width/Height      : 1920/1080
        Pixel Format      : 'NV12' (Y/UV 4:2:0)
        Field             : None
        Number of planes  : 1
        Flags             :
        Colorspace        : Default
        Transfer Function : Default
        YCbCr/HSV Encoding: Default
        Quantization      : Full Range
        Plane 0           :
           Bytes per Line : 1920
           Size Image     : 3110400
```

3.18.2 Set Resolution

Taking port 42 as an example, you can enter the following commands to set the resolution to 1920*1080.

```
# v4l2-ctl -d /dev/video42 --set-fmt-video=width=1920,height=1080,\
pixelformat='NV12'
```

3.18.3 Preview Camera

Taking port 42 as an example, you can set the preview of the camera video by using the following command.

```
# export DISPLAY=:0.0
# export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/lib/aarch64-linux-
gnu/gstreamer-1.0
#gst-launch-1.0 v4l2src device=/dev/video42 \
! video/x-raw,format=NV12,width=1920,height=1080,framerate=30/1 \
! xvimagesink
```

3.18.4 Camera Photography

Taking port 42 as an example, the following command can be used to take a camera photo, and the save address is picture.jpg in the current directory.

```
# gst-launch-1.0 v4l2src device=/dev/video42 num-buffers=1 \
! video/x-raw,format=NV12,width=1920,height=1080 ! jpegenc !
filesink loca- tion= picture.jpg
```

3.18.5 Camera Screen Recording

Taking port 42 as an example, the following command can be used to record videos with the camera, and the save address is video.mp4 in the current directory.

```
# gst-launch-1.0 -e \
v4l2src device=/dev/video42 \
! video/x-raw,format=NV12,width=1920,height=1080,framerate=25/1 \
! videoconvert \
! x264enc bitrate=5000 speed-preset=ultrafast tune=zerolatency \
! h264parse \
! mp4mux \
! filesink location= video.mp4
```

3.19 ADC PIN Header

AOM-3841 has two ADC channels. According to the hardware specification, the user needs to modify the connection status of the jumper on the substrate, adjust it to position 2-3.

Table 3.6: ADC PIN Header	
Device Name	**ADC Port Pin**
ADC1	J32 (2-3)
ADC2	J29 (2-3)

Test one ADC1 port.

```
# cat /sys/bus/iio/devices/iio\:device0/in_voltage4_raw 4095
```

Test one ADC2 port.

```
# cat /sys/bus/iio/devices/iio\:device0/in_voltage5_raw 4095
```

The value collected by ADC is not a fixed value. The figures in the manual are for reference only.

3.20 More Technical Support and Assistance

Click on the screenshot or link below to get more information about Advantech Arm computing products.

ESS-WIKI (advantech.com.tw)

http://ess-wiki.advantech.com.tw/view/RISC

Also, you can post your questions or queries on our AIM-Linux community. Click on the screenshot or link below to join us now.
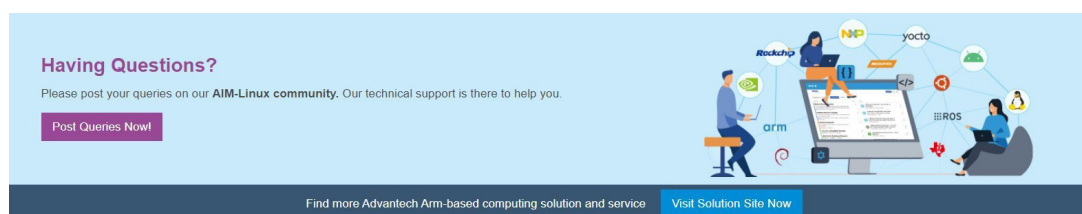
Advantech AIM-Linux Community - Welcome to the Advantech AIM-Linux Community!

https://forum.aim-linux.advantech.com

Chapter **4**

System Recovery

This chapter introduces how to recover the Linux operating system if it is damaged accidentally.

4.1 Create "update.img"

1. Download Release Image to PC (Windows OS).
2. Decompress the Image, double click mkupdate.bat in folder "rockdev".

Then you can find "update.img" in folder "rockdev".

4.2 Using SDDiskTool to Create Upgrade SD

1. Insert SD Card to PC (Windows OS).
2. Decompress SDDiskTool, double click SD_Firmware_Tool.exe.
3. Create upgrade SD card.
   (1)Choose the SD device.
   (2)Choose the "Upgrade firmware".
   (3)Choose the update.img path.
   (4)Create the update SD.
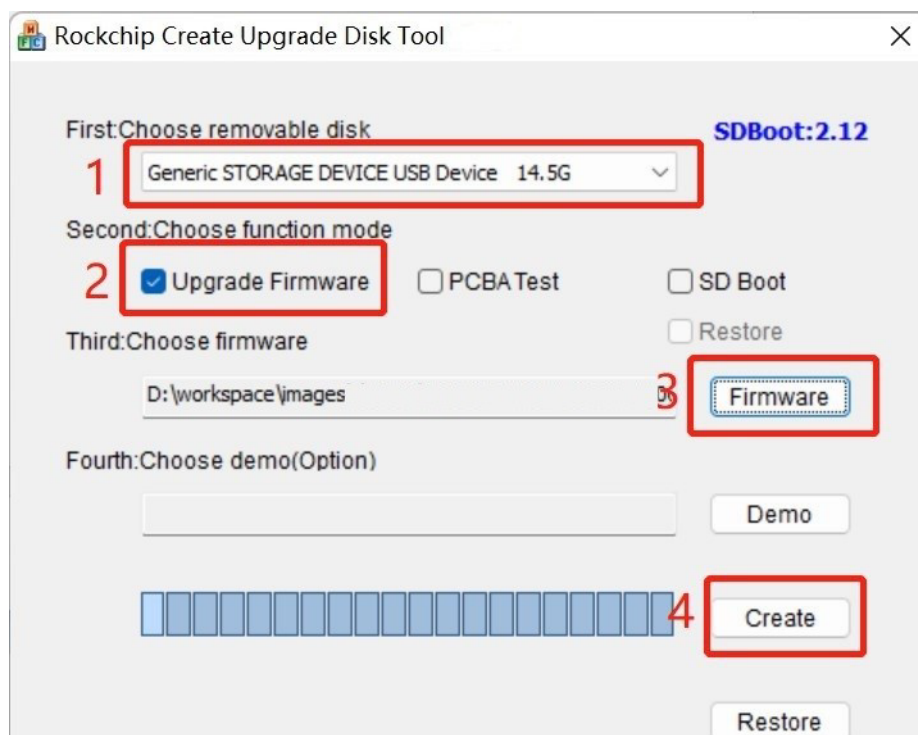
4. Create the upgrade SD card Success.
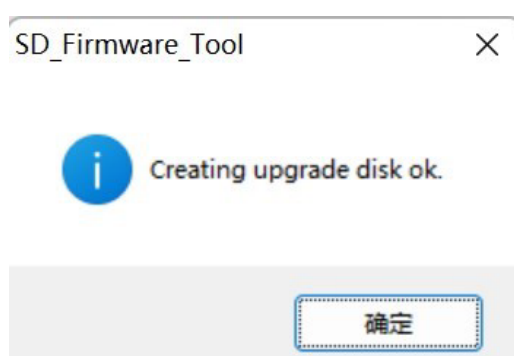
4.3 Upgrade or Recovery AOM-3841

1. Power off AOM-3841.
2. Insert the upgrade SD card to AOM-3841.
3. Power on AOM-3841. It will automatic enter recovery mode to upgrade system.
4. If upgrade success, you will get the message "Please remove SD CARD!!!, wait for reboot" on screen and debug console.
5. Remove SD card.

Chapter 5

Advantech Services

This chapter details Advantech Design-In serviceability, technical support and warranty policy for AOM-3841 evaluation kit.

5.1 RISC Design-In Services
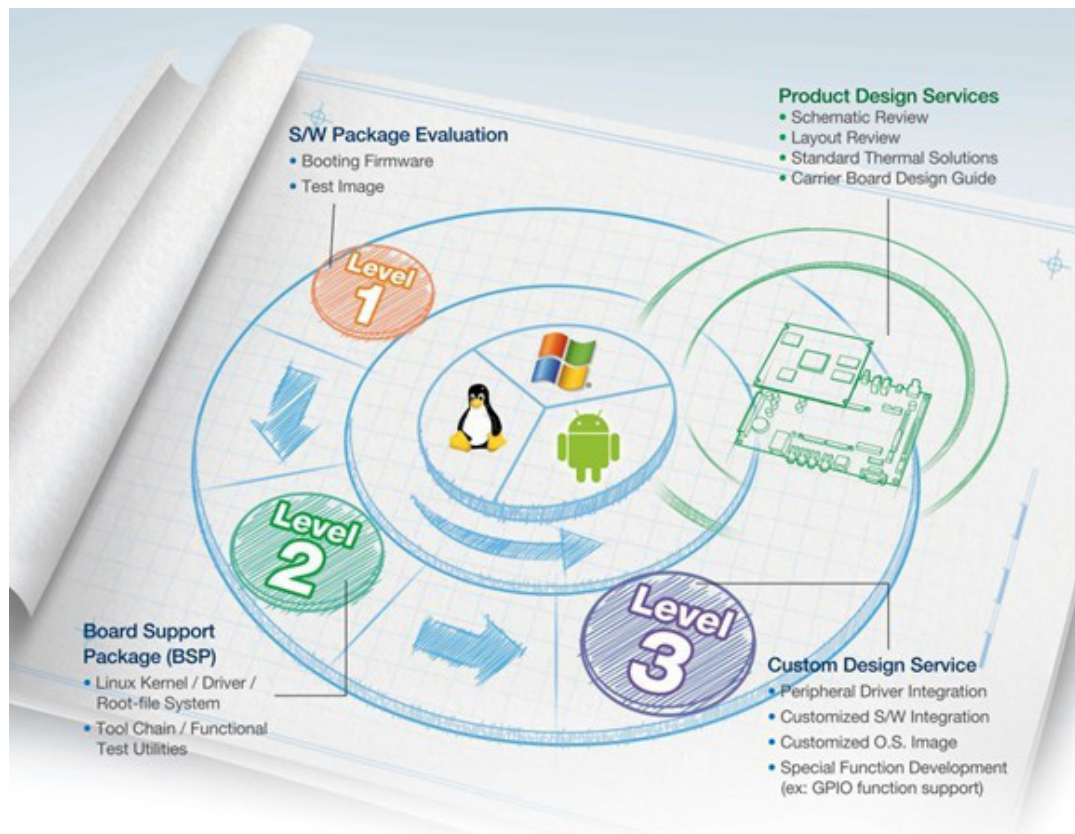
Advantech RISC Design-in Services help customers reduce the time and work involved in designing new carrier boards. We handle the complexities of technical research and greatly minimize the development risk associated with carrier boards.

Easy Development

Advantech features support firmware, root file-system, BSP, or other development tools for customers. These tools help customers develop their carrier board and differentiate their embedded products and applications.

- Full Range of RISC Product Offerings
- Comprehensive Document Support

Design Assistance Service

Advantech provides a check list for engineers to check their schematics and also review service based on customer carrier board schematics. Those services are preventative and help to catch design errors before they happen. This helps to save time and costs related to the development of carrier boards.

- Schematic review
- Placement and layout review
- Debugging assistance services
- General/Special reference design database

Thermal Solution Services

In order to provide quicker and more flexible solutions for customers' thermal designs. Advantech provides a thermal solution service—with reference to modularized thermal solutions and customized thermal solutions.

- Standard thermal solutions
- Customized thermal solutions

Embedded Software Services

Supports driver/software integration, or customized firmware, root file-system, and Linux image. Customer can save time and focus on their core development.

- Embedded Linux/Android OS
- Advantech Boot Loader Customization

With the spread of industrial computing, a whole range of new applications have been developed, resulting in a fundamental change to the IPC industry. In the past, System Integrators (SI) were accustomed to completing projects without outside assistance. Now such working models are obsolete. Due to diverse market demands and intense competition, cooperation for (both upstream and downstream) vertical integration has become a much more effective way to create competitive advantages. As a result, ARM-based CPU modules were born out of this trend. Concentrating all necessary components on the CPU modules and placing other parts on the carrier board in response to market requirements for specialization, provides greater flexibility while retaining low power consumption credentials.

Advantech has been involved in the industrial computer industry for many years and finds that customers usually have the following questions when implementing modular designs.

General I/O Design Capability

Although customers often possess the ability to perform vertical integration and have enough know-how and core competitiveness in the professional application field, the lack of general expertise and experience in power and I/O design causes many challenges for them; especially when integrating CPU modules into carrier boards.

The Acquisition of Information

Even if an individual client is able to obtain sufficient information to make the right decision for a specialized vertical application, some customers encounter problems dealing with general platform design and communicating with CPU or chipset manufacturers, thereby increasing carrier board design difficulties and risk as well as seriously impacting time-to-market and losing potential market opportunities.

Software Development and Modification

Compared to x86 architectures—RISC architectures use simpler instruction sets. Therefore the software support for x86 platforms cannot be used on RISC platforms. System integrators need to develop software for their system and do the hardware and software integration themselves. Unlike x86 platforms, RISC platforms have less support for Board Support Packages (BSP) and drivers as well. Even though driver support is provided, SI still have to make a lot of effort to integrate it into the system core. Moreover, the BSP provided by CPU manufacturers are usually for carrier board designs, so it's difficult for SI to have an environment for software development.

In view of this, Advantech proposed the concept of Streamlined Design-in Support Services for RISC-based Computers On Modules (COM). With dedicated professional design-in services, Advantech actively participates in carrier board design and problem solving. Our services not only enable customers to effectively distribute their resources, but also reduce R&D manpower cost and hardware investment.

By virtue of a close interactive relationship with leading original manufacturers of CPUs and chipsets such as ARM, TI, and NXP, Advantech helps solve communication and technical support difficulties, which, in turn, can reduce the uncertainties of product development. Advantech's professional software team also focuses on providing a complete Board Support Package and assists customers in building a software development environment for their RISC platforms.

Advantech RISC design-in services helps customers overcome their problems to achieve the most important goal of faster time to market through a streamlined RISC Design-in services.

Along with our multi-stage development process, which includes: planning, design, integration, and validation, Advantech's RISC design-in service provides comprehensive support through the following different phases:

Planning Stage

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process detailing product features, specifications, and compatibility testing with software. Advantech offers a RISC Customer Solution Board (CSB) as an evaluation tool for carrier boards which are simultaneously designed when developing RISC COMs. In the planning stage, customers can use this evaluator board to assess RISC modules and test peripheral hardware. What's more, Advantech provides standard software Board Support Package (BSP) for RISC COM, so that customers can define their product's specifications as well as verifying I/O and performance at the same time. We not only offer hardware planning and technology consulting, but also software evaluation and peripheral module recommendations (such as Wi-Fi, 3G, and BT). At this stage, resolving customer concerns is Advantech's primary goal. Since we all know that product evaluation regarding performance and specification is the key task in the planning period, we try to help our customers conduct all the necessary tests for their RISC COM.

Design Stage

When a product moves into the design stage, Advantech will supply a reference design guide for the carrier board. The carrier board design guide provides pin definitions for the COM connector with limitations and recommendations for carrier board design. Customers have access to a clear guideline during their carrier board development. Regarding different form factors, Advantech offers a complete pin-out check list for different form factors such as Q7, ULP, and RTX2.0, so that customers can examine the carrier board signals and layout design accordingly. In addition, our team is able to assist customers review the placement/layout and schematics to ensure the carrier board design meets their full requirements. For software development, Advantech RISC software team can help customers establish an environment for software development and evaluate the amount of time and resources needed. If customers outsource software development to a third party, Advantech can also cooperate with the third party to provide proficient consulting services. With Advantech's professional support, the design process becomes much easier and product quality will be improved to meet customer targets.

Integration Stage

This phase comprises HW/SW integration, application development, and peripheral module implementation. Due to the lack of knowledge and experience on platforms, customers need to spend a certain amount of time analyzing integration problems. In addition, peripheral module implementation is relevant to driver designs on carrier boards, RISC platforms usually have less support for ready-made drivers on the carrier board, therefore customers have to learn by trial and error to get the best solution with the least effort. Advantech's team has years of experience in customer support and HW/SW development. We can support customers with professional advice and information to shorten development time and enable more effective product integration.

Validation stage

After customer's ES sample is completed, the next step is a series of verification procedures. In addition to verifying a product's functionality, the related test of the product's efficiency is also an important part at this stage especially for RISC platforms.

Advantech helps customers solve their problems in the testing process and will give suggestions and tips as well. Through an efficient verification process backed by our technical support, customers are able to optimize their applications with less fuss. Furthermore, Advantech's team can provide professional consulting services about further testing and equipment usage, so customers can find the right tools to efficiently identify and solve problems to further enhance their products quality and performance.

5.2 Contact Information

Below is the contact information for Advantech customer service.

Table 5.1: Contact Information	
Region/Country	**Contact Information**
United States of America	1-888-576-9688
Brazil	0800-770-5355
Mexico	01-800-467-2415
Europe (Toll Free)	00800-2426-8080
Singapore & SAP	65-64421000
Malaysia	1800-88-1809
Australia (Toll Free)	1300-308-531
China (Toll Free)	800-810-0345 800-810-8389 Sales@advantech.com.cn
India (Toll Free)	1-800-425-5071
Japan (Toll Free)	0800-500-1055
Korea (Toll Free)	080-363-9494 080-363-9495
Taiwan (Toll Free)	0800-777-111
Russia (Toll Free)	8-800-555-01-50

You can also reach our service team through the website below; our technical support engineer will provide quick response once the form is filled out:

http://www.advantech.com.tw/contact/default.aspx?page=contact_form2&sub-ject=Technical+Support

5.3 Technical Support and Assistance

5.3.1 Warranty Policy

Below is the warranty policy for Advantech products:

5.3.1.1 Warranty Period

Advantech branded off-the-shelf products and third party off-the-shelf products used to assemble Advantech's Configure-to-Order products are entitled to a two year complete and prompt global warranty service. Product defects in design, materials, and workmanship are covered from the date of shipment.

All customized products will, by default, carry a 15-month regional warranty service. The actual product warranty terms and conditions may vary based on sales contract.

All third party products purchased separately will be covered by the original manufacturer's warranty and time period, and shall not exceed one year of coverage through Advantech.

5.3.1.2 Repairs Under Warranty

It is possible to obtain a replacement (Cross-Shipment) within the first 30 days of purchase through your original Advantech supplier. Arrange Dead on Arrival (DOA) replacement if the products purchased directly from Advantech are DOA. The DOA Cross-Shipment excludes any shipping damage to customized and/or build-to-order products.

For those products which are not DOA, the return fee to an authorized ADVANTECH repair facility will be the customers' expense. The return shipping fee for refurbished products from Advantech to the customers' sites will be Advantech's expense.

5.3.1.3 Exclusions from Warranty

The product is excluded from warranty if:

- The product has been found to be defective after expiry of the warranty period.
- Warranty has been voided by removal or alternation of product or part identification labels.
- The product has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment, improperly maintained by the customer, or a failure for which Advantech is not responsible—whether by accident or other cause. Such conditions will be determined by Advantech at its sole unfettered discretion.
- The product is damaged beyond repair due to a natural disaster such as a lighting strike, flood, earthquake, etc.
- Product updates/upgrades and tests upon the request of customers who are without warranty.

5.3.2 Repair Process

5.3.2.1 Obtaining an RMA Number

All returns from customers must be authorized with an Advantech Return Merchandise Authorization (RMA) number. Any returns of defective units or parts without valid RMA numbers will not be accepted; they will be returned to the customer at the customer's cost without prior notice.

An RMA number is only an authorization for returning a product; it is not an approval for repair or replacement. When requesting an RMA number, please access Advantech's RMA web site: http://erma.Advantech.com.tw with an authorized user ID and password.

You must fill out basic product and customer information as well as describe the problems encountered in detail in "Problem Description". Vague entries such as "does not work" or "failure" are not acceptable.

If you are uncertain about the cause of the problem, please contact Advantech's Application Engineers (AE). They may be able to find a solution that does not require sending the product for repair.

The serial number of the whole set is required if only a key defective part is returned for repair. Otherwise, the case will be regarded as out-of-warranty.

5.3.2.2 Returning Products for Repair

It's possible customers can save time and meet end-user requirements by returning defective products to any authorized Advantech repair facility without an extra cross-region charge. You are required to contact the local repair center before requesting global repair services.

It is recommended that you send cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as CPU, DRAM, and CF Card. If you send all these parts back (because you believe they may be part of the problem), please note their inclusion clearly. Otherwise, Advantech is not responsible for any items not listed. Make sure the "Problem Description" is enclosed.

European Customers that are located outside European Community should use UPS as the forwarding company. We strongly recommend adding a packing list to all shipments. Please prepare a shipment invoice according to the following guidelines to decrease goods clearance time:

1. Give a low value to the product on the invoice, or additional charges will be levied by customs that will be borne by the sender.
2. Add information "Invoice for customs purposes only with no commercial value" on the shipment invoice.
3. Show RMA numbers, product serial numbers and warranty status on the shipment invoice.
4. Add information about Country of origin of goods.
   In addition, please attach an invoice with RMA number to the package, then write the RMA number on the outside of the carton and attach the packing slip to save handling time. Please also address the parts directly to the Service Department and mark the package "Attn. RMA Service Department".

All products must be returned in properly packed ESD material or anti-static bags. ADVANTECH reserves the right to return un-repaired items at the customer's cost if they are inappropriately packed.

"Door-to-Door" transportation such as speed post is recommended for delivery, otherwise, the sender should bear additional charges such as clearance fees if Air-Cargo is adopted.

Should DOA cases fail, Advantech will take full responsibility for the product and transportation charges. If the items are not DOA, but fail within warranty, the sender will bear the freight charges. For out-of-warranty cases, customers must cover the cost and take care of both outward and inward transportation.

5.3.2.3 Service Charges

The product is excluded from warranty if:

- The product is repaired after expiry of the warranty period.
- The product is tested or calibrated after expiry of the warranty period, and a No Problem Found (NPF) result is obtained.
- The product, though repaired within the warranty period, has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole unfettered discretion.
- The product is damaged beyond repair due to a natural disaster such as a lighting strike, flood, earthquake, etc.
- Product updates and tests upon the request of customers who are without warranty.

If a product has been repaired by V, and within three months after such a repair the product requires another repair for the same problem, Advantech will do this repair free of charge. However, such free repairs do not apply to products which have been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or have failed for reasons in which Advantech is not responsible whether by accident or other cause.

Please contact your nearest regional service center for detailed service quotations.

Before we start out-of-warranty repairs, we will send you a pro forma invoice (P/I) with the repair charges. When you remit the funds, please reference the P/I number listed under "Our Ref". Advantech reserves the right to deny repair services to customers that do not return the DOA unit or sign the P/I. Meanwhile, Advantech will scrap defective products without prior notice if customers do not return the signed P/I within 3 months.

5.3.2.4 Repair Report

Advantech returns each product with a "Repair Report" which shows the result of the repair. A "Repair Analysis Report" is also provided to customers upon request. If the defect is not caused by Advantech design or manufacturing, customers will be charged US$60 or US$120 for in-warranty or out-of-warranty repair analysis reports respectively.

5.3.2.5 Custody of Products Submitted for Repair

Advantech will retain custody of a product submitted for repair for one month while it is waiting for return of a signed P/I or payment (A/R). If the customer fails to respond within such period, Advantech will close the case automatically. Advantech will take reasonable measures to stay in proper contact with the customer during this one month period.

5.3.2.6 Shipping Back to Customer

The forwarding company for RMA returns from Advantech to customers is selected by Advantech. Per customer requirement, other express services can be adopted, such as UPS, FedEx and etc. The customer must bear the extra costs of such alternative shipment. If you require any special arrangements, please indicate this when shipping the product to us.

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