

## RSB-3730

NXP iMX8M Mini ARM<sup>®</sup>  
Cortex<sup>®</sup>-A53 2.5" SBC with  
UIO40 Express

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## Product Warranty (2 years)

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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.

## Packing List

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

- 1 x RSB-3730 SBC with heatsink

## Ordering Information

Part No.	Description	UART1
RSB-3730CQ-XDA1E	2GDDR/16GeMMC, LVDS,0~60	UART1 to UIO
RSB-3730WQ-XDA1E	2GDDR/16GeMMC, LVDS,-40~85	UART1 to UIO
RSB-3730CQ-XHA1E	4GDDR/32GeMMC, HDMI,0~60	UART1 to M.2
RSB-3730CQ-XNA1E	2GDDR/16GeMMC, DSI,0~60	UART1 to UIO

## Optional Accessories

Part No.	Description
96PSA-A36W12R1-3	ADP A/D 100-240V 36W 12V C6 DC PLUG 90° 62368
1700031429-01	Line-Out cable
1700026878-01	Mic-In cable
1702002605	Power Cord 3P EU 10A 250V 183cm
1700008921	Power Cord 3P PSE 183cm
1702031801	Power Cord 3P UK 10A 250V 183cm
1702002600	Power Cord UL 3P 10A 125V 183cm
1700009652	Power Cord CCC 3P 10A 250V 187cm

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

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## 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 .....1

1.1	Introduction .....	2
1.2	Product Features.....	2
	Table 1.1: Product Features .....	2
1.3	Mechanical Specifications.....	3
1.4	Electrical Specifications .....	3
1.5	Environmental Specifications.....	3
1.6	Block Diagram.....	4

## Chapter 2 H/W Installation.....5

2.1	Jumper and Connector Locations .....	6
2.2	Board Dimensions.....	7
	Figure 2.1 Board Dimensions .....	7
2.3	Jumpers .....	8
2.3.1	Jumper Description .....	8
2.3.2	Jumper List .....	8
	Table 2.1: Jumper List .....	8
2.3.3	Jumper Settings .....	9
	Table 2.2: VDD .....	9
	Table 2.3: BLP1 .....	9
	Table 2.4: SW1 .....	10
	Table 2.5: BTN .....	10
2.4	Connectors.....	11
2.4.1	Connector List.....	11
	Table 2.6: Connector List .....	11
2.4.2	Connector Pin Definitions .....	11
	Table 2.7: RS232/Debug Port (COM1/DEBUG2).....	11
	Figure 2.2 COM1/DEBUG2 Connector .....	11
	Table 2.8: RTC Battery Connector (BAT).....	12
	Figure 2.3 DC RTC Battery Connector .....	12
	Table 2.9: M.2 (M2) .....	12
	Figure 2.4 M.2 CONN .....	13
	Table 2.10: LOUT Connector .....	14
	Figure 2.5 LOUT Connector .....	14
	Table 2.11: MIC Connector .....	14
	Figure 2.6 MIC Connector .....	14
	Table 2.12: UIO1 .....	14
	Table 2.13: UIO2 .....	15
	Table 2.14: LVDS Connector (LVDS).....	16
	Figure 2.7 LVDS Connector.....	16
	Table 2.15: LVDS Inverter Power Connector (BL) .....	17
	Figure 2.8 LVDS Inverter Power Connector .....	17
	Table 2.16: Micro SD Slot (SD) .....	18
	Figure 2.9 Micro SD Slot.....	18
	Table 2.17: Mini PCIe (MPCIE) .....	19
	Figure 2.10 Mini PCIe Connector .....	20
	Table 2.18: NANO SIM Card Slot (SIM) .....	21
	Figure 2.11 NANO SIM Card Slot.....	21
	Table 2.19: Micro USB Connector (OTG).....	21
	Figure 2.12 Micro USB Connector .....	21
	Table 2.20: DC Power Jack (DCIN1).....	22
	Figure 2.13 DC Jack .....	22
	Table 2.21: RS232 & R485 (COM).....	22

	Figure 2.14 COM .....	22
	Table 2.22: Ethernet Connector (LAN1) .....	23
	Figure 2.15 Ethernet Connector .....	23
	Table 2.23: HDMI Connector (HDMI) .....	24
	Figure 2.16 HDMI Connector .....	24
	Table 2.24: USB Type-A Connector (USB1) .....	25
	Figure 2.17 USB Port Connector .....	25
	Table 2.25: Reset Button (RST) .....	25
	Figure 2.18 Reset Button .....	25
	Table 2.26: LEDs .....	26
	Figure 2.19 LED .....	26
2.5	Quick Start .....	26
2.5.1	Debug Port Connection .....	26
	Table 2.27: Debug Port Connection .....	26
2.5.2	Debug Port Settings .....	27
	Figure 2.20 HyperTerminal Settings for Terminal Setup .....	27

## Chapter 3 Software Functionality ..... 29

3.1	Introduction .....	30
3.2	Commands .....	30
3.2.1	Uboot .....	30
3.2.2	Kernel .....	30
3.3	GPIO .....	31
	Table 3.1: GPIO .....	31
3.4	UART .....	32
3.4.1	RSB-3730 UART .....	32
	Table 3.2: RSB-3730 UART .....	32
3.4.2	How to Configure RS232 or RS485 Mode .....	32
3.5	Audio .....	33
3.6	I2c Test .....	34
3.7	SD/MMC Card/USB/SpiFlash .....	34
3.7.1	Device Routes .....	34
3.7.2	USB Disk Test .....	34
3.8	RTC .....	35
3.9	Watchdog .....	35
3.10	HDMI .....	36
3.10.1	HDMI Resolution .....	36
3.11	LVDS .....	36
3.11.1	LVDS- Panel .....	36
3.11.2	MIPI DSI Panel: G101UAN02.0 .....	36
3.12	TPM .....	37

## Chapter 4 Network Setup ..... 39

4.1	Wi-Fi Setup .....	40
4.2	BT .....	40
4.3	4G .....	40
4.4	Ethernet .....	41
4.5	Installing the System from an SD Card .....	42

## Chapter 5 Advantech Services ..... 43

5.1	RISC Design-In Services .....	44
5.2	Contact Information .....	48
5.3	Global Service Policy .....	49
5.3.1	Warranty Policy .....	49
5.3.2	Repair Process .....	50

# Chapter 1

General

## 1.1 Introduction

RSB-3730 is a RISC 2.5" single board computer (SBC) powered by an NXP i.MX8M Mini Cortex-A53 Quad high-performance processor. It offers a single display via HDMI/LVDS/DSI and plenty of I/O with 1 x GbE, 3 x serial, 5 x USB, 11 x GPIO. RSB-3730 also features Mini-PCIe for LTE and M.2 for Wi-Fi/BT. It is an ideal solution for healthcare, security, IoT gateways, and vending machine applications.

## 1.2 Product Features

**Table 1.1: Product Features**

Specification	Feature	Description
<b>Form Factor</b>		2.5" SBC with UIO40-Express for I/O expansion
<b>Processor</b>	CPU	NXP i.MX 8M Mini up to 4 Arm Cortex A53 cores, up to 1.8 GHz
	NPU	NA
<b>Memory</b>	Technology	LPDDR4 up to 1500 MHz
	Capacity	On-board 2/4 GB
<b>Flash</b>	Flash	16GB/32GB/64GB of eMMC NAND Flash for OS and Advantech boot loader
	SPI Flash	NA
<b>Display</b>	LVDS	1 Dual Channel 18-/24-Bit LVDS, backlight power, 5/12V, Max. 1A (shared with DSI-to-HDMI according to the BOM option)
	HDMI1	1 x HDMI 1.4
	DSI	1 x MIPI DSI (Shared with the LVDS connector according to the BOM, shared with DSI-to-HDMI)
	Graphics Engine	Vivante GC320, GC Nano Ultra 3D GPU Support OpenGL ES 2.0, VG 1.1
	H/W Video Codec	Decoder: 1080p60 H265, VP9; 1080p60 H264, VP8 Encoder: 1080p60 H.264, VP8
<b>Video In</b>	MIPI CSI	NA
<b>Ethernet</b>	Chipset	1 x RTL8211FSI-CG
	Speed	1 10/100/1000 Mbps
<b>Watchdog Timer</b>		Yes
<b>TPM</b>		TPM 2.0 (ST33HTPH2E32AHB8) (optional)
<b>RTC</b>		RTC Battery via 2-pin type connector
<b>Coastline</b>	HDMI	1
	USB	2 x USB 2.0 Type-A
	USB OTG	1
	Ethernet	1 10/100/1000 Mbps
	RS232/485	1 by DB9
	Reset	1
	DC Jack	1
<b>Internal I/O</b>	Audio	Line-Out, Mic-In (optional)
	Debug	1 x Debug port for A53
	UIO-Express A	4 x GPIO, 3 x USB 2.0
	UIO-Express B	8 x GPIO, 2 x RS232, 1 x I2C
	LED	1 x Power green LED, 1 x programmable blue LED
<b>Security</b>	Security	TrustZone
<b>Bootup</b>	Bootup Device	SD card, EMMC, by jumper



<b>Expansion</b>	SD	1 x Micro SD Slot
	Mini PCIe	1, w/ USB 2.0 signal
	M.2	E-Key 2230, w/ SDIO & UART (optional) w/ PCIe & USB signal
	SIM	1, Nano SIM Slot
<b>Power</b>	Power Supply Voltage	+12V
	Power Type	Lockable DC-Jack (2-pin type connector according to BOM option)
<b>Environment</b>	Operating Temp	0 ~ 60 / -40 ~ 85°C
	Storage Temp.	-40 ~ 85°C 5%~95% relative humidity, non-condensing
<b>Certification</b>		CE/FCC Class B
<b>Operating System</b>		Linux Yocto

## 1.3 Mechanical Specifications

- **Dimensions:** 100 x 72 x 19 mm
- **Height:** 19 mm
- **Reference Weight:** 0.34 kg

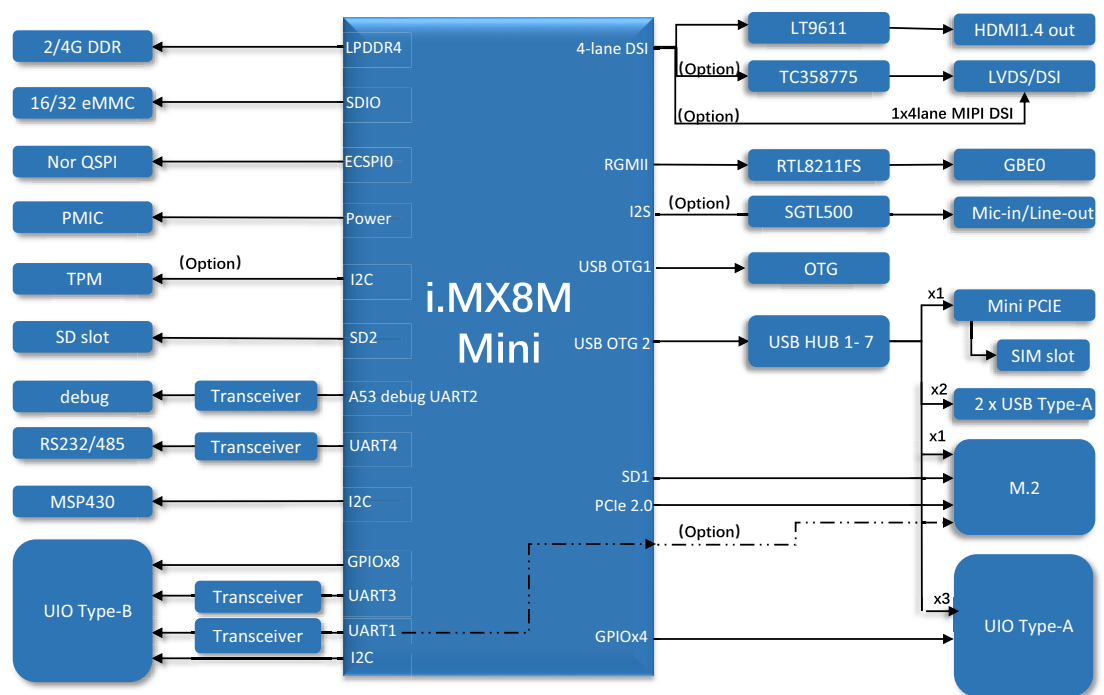
## 1.4 Electrical Specifications

- **Power supply type:** DC-in 12V
- **RTC battery:**
  - **Typical voltage:** 3V
  - **Normal discharge capacity:** 210 mAh

## 1.5 Environmental Specifications

- **Operating temperature:** 0 ~ 60°C / -40 ~ 85°C
- **Operating humidity:** 5 ~ 95% relative humidity, non-condensing
- **Storage temperature:** -40 ~ 85°C (-40 ~ 185°F)
- **Storage humidity:** 60°C @ 95% RH non-condensing

## 1.6 Block Diagram



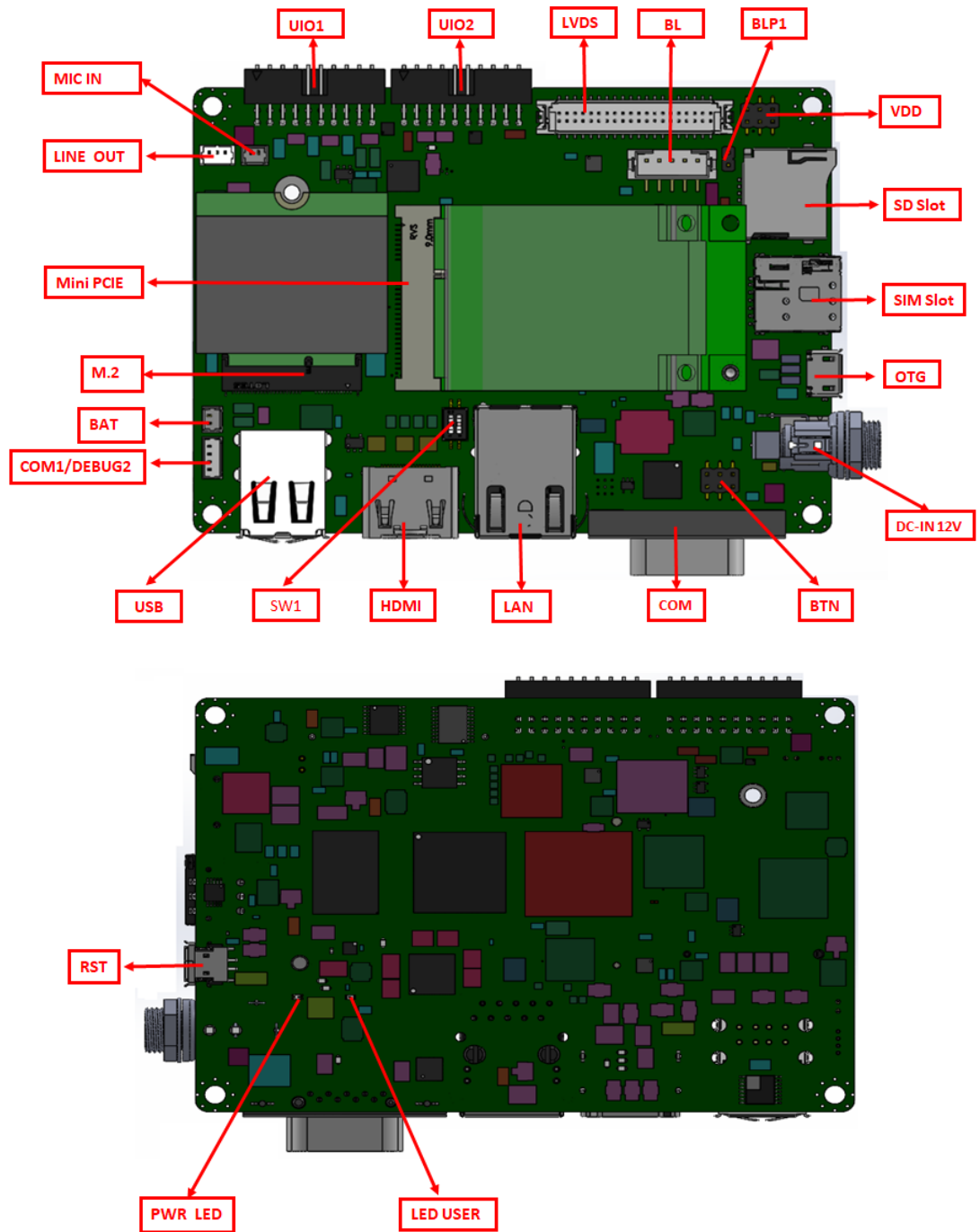
# Chapter 2

## H/W Installation

This chapter gives mechanical and connector information on the RSB-3730.

## 2.1 Jumper and Connector Locations

The following sections show the external connectors and pin assignments for applications.



## 2.2 Board Dimensions

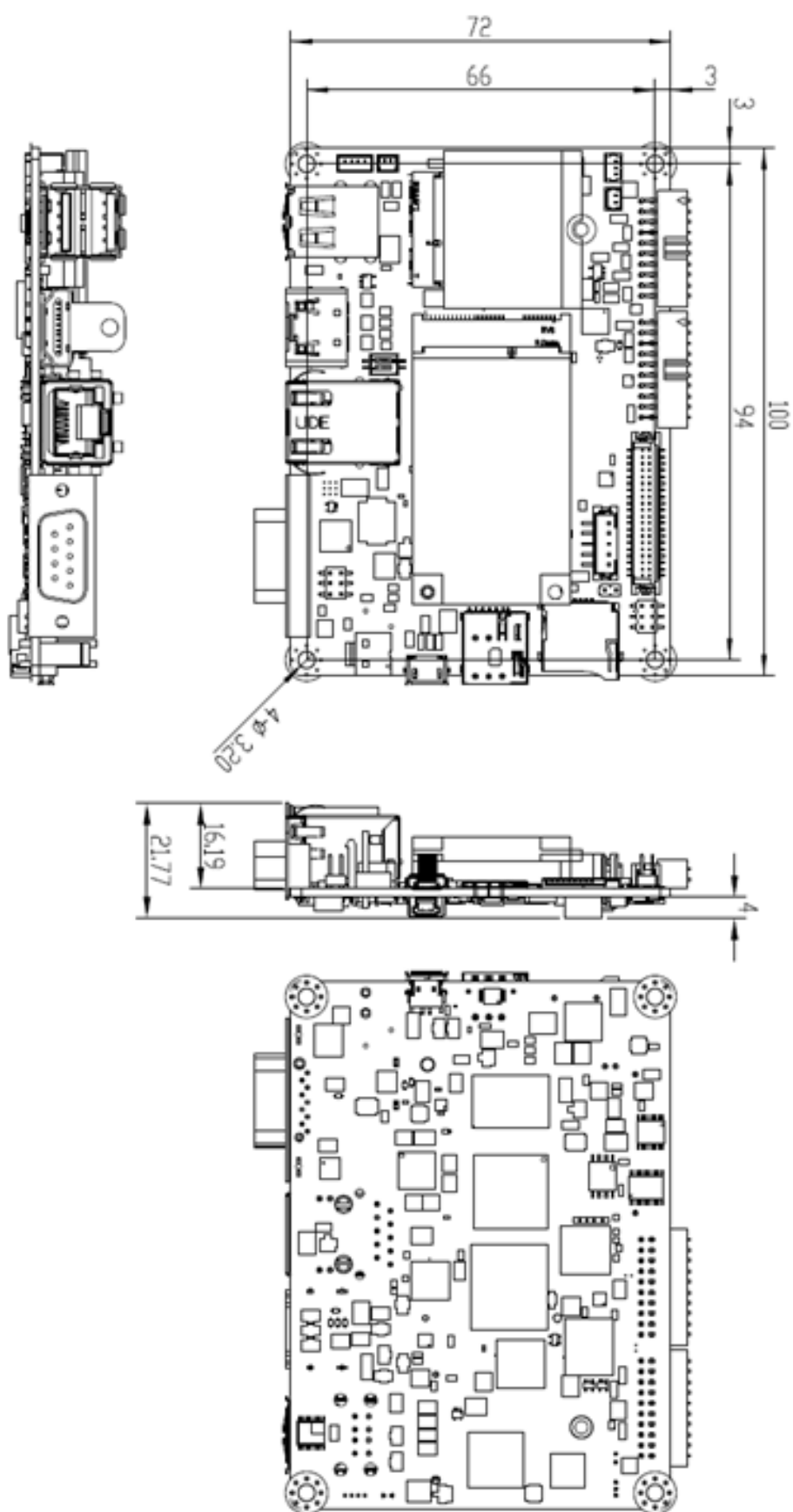
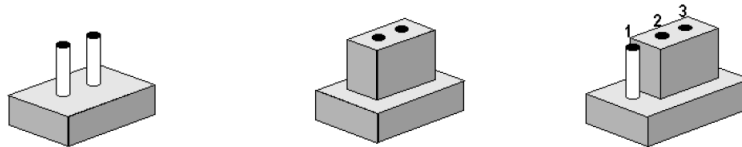


Figure 2.1 Board Dimensions

## 2.3 Jumpers

### 2.3.1 Jumper Description

Cards can be configured 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.



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.

**Warning!** To avoid damaging the computer, always turn off the power supply before setting jumpers.



### 2.3.2 Jumper List

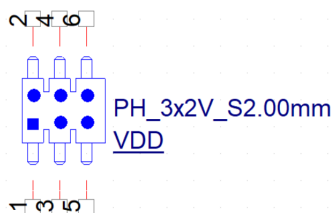
**Table 2.1: Jumper List**

VDD	VDD 3.3V & 5V LVDS VDD & Backlight power level select
BLP1	LVDS Backlight power 12V select
SW1	AT & ATX Mode select and boot mode select
BTN	Power Button

### 2.3.3 Jumper Settings

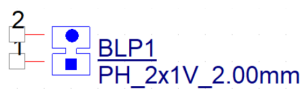
**Table 2.2: VDD**

<b>VDD</b>	VDD 3.3V & 5V level select
<b>Part number</b>	1653003260
<b>Footprint</b>	HD_3x2P_79
<b>Description</b>	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
<b>Setting</b>	<b>Function</b>
(1-3)	LVDS VDD POWER 5V
(3-5)	LVDS VDD POWER 3.3V
(2-4)	LVDS Backlight POWER 5V
(4-6)	LVDS Backlight POWER 3.3V



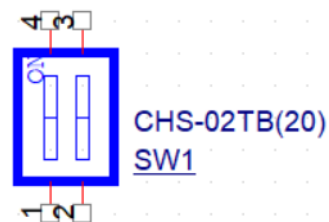
**Table 2.3: BLP1**

<b>BLP1</b>	LVDS BKLT PWR 12V level select
<b>Part number</b>	1653002101-02
<b>Footprint</b>	HD_2x1P_79_D
<b>Description</b>	PIN HEADER 2x1P 2.0mm 180D(M) DIP 21N12050
<b>Setting</b>	<b>Function</b>
(1-2)	LVDS Backlight POWER 12V

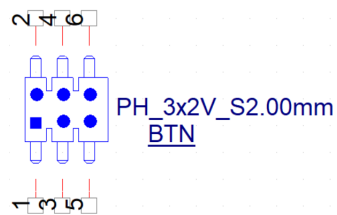


**Table 2.4: SW1**

<b>SW1</b>	AT & ATX Mode and boot mode select
<b>Part Number</b>	1600000202
<b>Footprint</b>	SW_2x2P_50_161X315
<b>Description</b>	DIP SW CHS-02TB(29) SMD 4P SPST P=1.27mm W=5.4mm
<b>Setting</b>	<b>Function</b>
(1-4) ON	AT
(1-4) OFF	ATX
(2-3) ON	Boot from SD
(2-3) OFF	Boot from eMMC

**Table 2.5: BTN**

<b>BTN</b>	Power Button & Watchdog AT & ATX Mode
<b>Part number</b>	1653003260
<b>Footprint</b>	HD_3x2P_79
<b>Description</b>	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
<b>Setting</b>	<b>Function</b>
(1-2)	For power button cable connection when SW1 selects ATX Mode





## 2.4 Connectors

### 2.4.1 Connector List

Table 2.6: Connector List	
COM1/DEBUG2	Debug CONN
BAT	RTC CONN
M.2	M.2 CONN
LINE OUT	LINE OUT CONN
MIC IN	MIC IN CONN
UIO1	UIO1
UIO2	UIO2
LVDS	LVDS CONN
BL	LVDS Back light CONN
SD	SD slot
MPCIE	PCIE Express Mini Card CONN
SIM	SIM slot
OTG	OTG
DCIN	DC-IN JACK
USB1	USB CONN
HDMI	HDMI CONN
COM	COM CONN
LAN1	LAN CONN
RST	RST CONN
LED	LED

### 2.4.2 Connector Pin Definitions

#### 2.4.2.1 RS232/Debug Port (COM1/DEBUG2)

RSB-3730 can communicate with a host server (Windows or Linux) by using a debug cable (Advantech number: 1700021565-11). If you need a boot select out box, you can use the appropriate cable (Advantech number: 1700034046-01).

Table 2.7: RS232/Debug Port (COM1/DEBUG2)	
Pin	Description
1	BOOT_SEL
2	COM2_TXD
3	COM2_RXD
4	GND



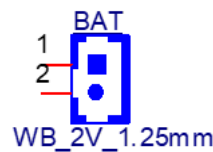
Figure 2.2 COM1/DEBUG2 Connector

#### 2.4.2.2 RTC Battery Connector (BAT)

RSB-3730 supports a lithium 3V\_210mAH CR2032 battery with wafer box.

**Table 2.8: RTC Battery Connector (BAT)**

Pin	Description
1	+COIN_RTC
2	GND



**Figure 2.3 DC RTC Battery Connector**

#### 2.4.2.3 M.2 (M2)

RSB-3730 supports the socket1 connectivity type 2230 S1&S2&S3 E-Key M.2 interface. The detailed pin definitions are as shown below.

**Table 2.9: M.2 (M2)**

Pin	Signal Name	Pin	Signal Name
1	GND	2	+V3.3_M2
3	USB_M2_D+	4	+V3.3_M2
5	USB_M2_D-	6	NC
7	GND	8	NC
9	SD1_CLK	10	NC
11	SD1_CMD	12	NC
13	SD1_DATA0	14	NC
15	SD1_DATA1	16	NC
17	SD1_DATA2	18	GND
19	SD1_DATA3	20	UART1_WAKE#_3V3
21	SD1_WAKE#	22	UART1_RX_M2 (co-lay to UIO2 COM1_RXD according to BOM option)
23	SD1_RESET#		
Mechanical Key	Mechanical Key	Mechanical Key	Mechanical Key
		32	UART1_TX_M3 (co-lay to UIO2 COM1_TXD according to BOM option)
33	GND	34	UART1_CTS#_M2
35	PCIE_TXN_P	36	UART1_RTS#_M2
37	PCIE_TXN_N	38	NC
39	GND	40	NC
41	PCIE_RXN_P	42	NC
43	PCIE_RXN_N	44	NC

Table 2.9: M.2 (M2)			
45	GND	46	NC
47	PCIE_B_REFCK_P	48	NC
49	PCIE_B_REFCK_N	50	M2_SYSCLK_3V3
51	GND	52	PERST#
53	PCIE_CLKREQ#	54	NGFF_BT_DISABLE#
55	+3.3V PU to 10Kohm	56	NGFF_WIFI_DISABLE#
57	GND	58	NC
59	NC	60	NC
61	NC	62	BT_WAKE_HOST
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	+V3.3_M2
73	NC	74	+V3.3_M2
75	GND		

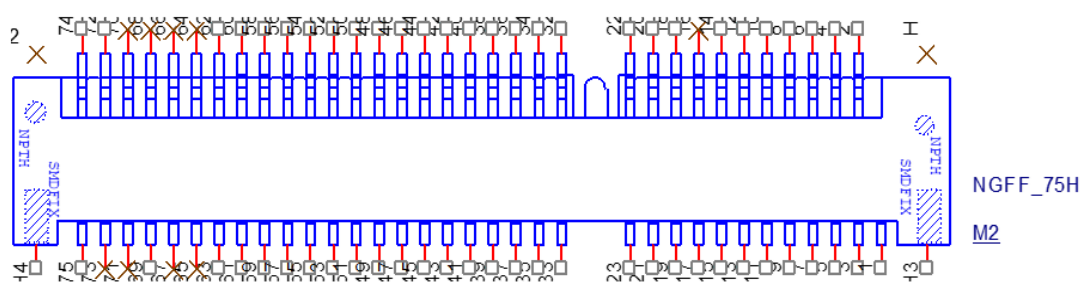


Figure 2.4 M.2 CONN

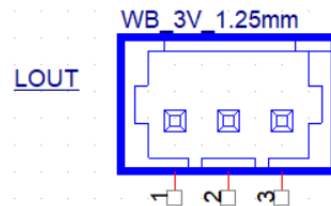
#### 2.4.2.4 Audio (LOUT)

RSB-3730 supports a Line-Out and Mic-In interface.

The LOUT pin definitions are as shown below.

**Table 2.10: LOUT Connector**

Pin	Description
1	LINEOUT_L
2	LINEOUT_R
3	AGND

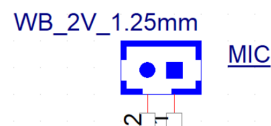


**Figure 2.5 LOUT Connector**

The MIC connector pin definitions are as shown below.

**Table 2.11: MIC Connector**

Pin	Description
1	MIC_IN
2	AGND



**Figure 2.6 MIC Connector**

#### 2.4.2.5 UIO

RSB-3730 supports UIO-40 express UIO. The pin definitions are as shown below:

**Table 2.12: UIO1**

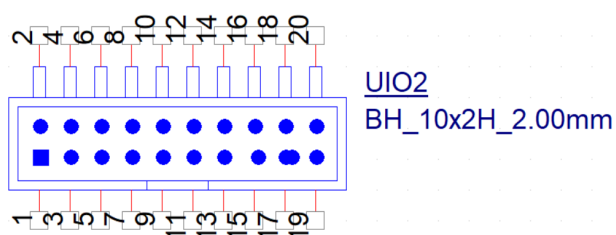
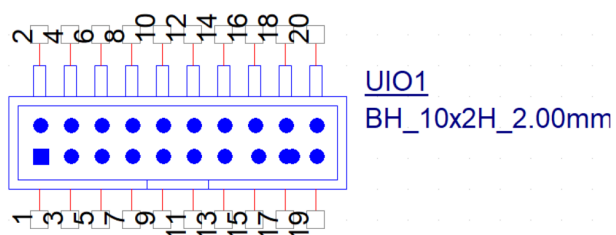
Pin	Signal Name	Pin	Signal Name
1	+V5_USB1	2	GND
3	USB1_D-	4	USB2_D+
5	USB1_D+	6	USB2_D-
7	GND	8	+V5_USB2
9	GPIO1 (from CPU)	10	GPIO2 (from CPU)
11	GPIO3 (from CPU)	12	GPIO4 (from CPU)
13	+V5_USB3	14	GND
15	USB3_D-	16	NC

**Table 2.12: UIO1**

17	USB3_D+	18	NC
19	GND	20	NC

**Table 2.13: UIO2**

Pin	Signal Name	Pin	Signal Name
1	+V5_OUT	2	GND
3	COM1_TXD co-lay with M.2 UART1_TX_M3 by BOM option	4	COM4_TXD
5	COM1_RXD co-lay with M.2 UART1_RX_M2 by BOM option	6	COM4_RXD
7	GPIO5 (from CPU)	8	GPIO6 (from CPU)
9	GPIO7 from I2C to GPIO chipset TCA9538PWR	10	GPIO8 (from CPU)
11	GPIO9 from I2C to GPIO chipset TCA9538PWR	12	GPIO10 (from CPU)
13	GPIO11 from CPU or I2C to GPIO chipset TCA9538PWR by SW setting	14	GPIO12 from CPU or I2C to GPIO chipset TCA9538PWR by SW setting
15	NC	16	I2C4_SDA_CONN
17	NC	18	I2C4_SCL_CONN
19	+V3.3_OUT	20	GND

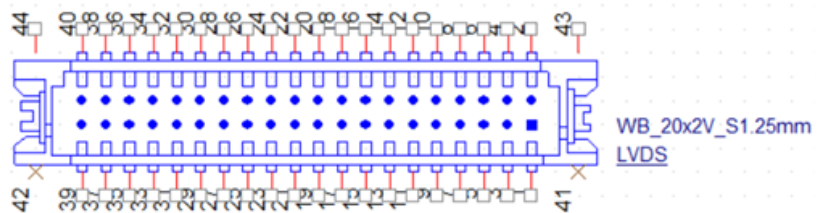


#### 2.4.2.6 LVDS Connector (LVDS)

RSB-3730 provides an LVDS 20x2-pin board-to-board connector for one-port single-channel 24-bit LVDS or one-port dual-channel 24-bit LVDS, or four-lane MIPI DSI according to the BOM option.

**Table 2.14: LVDS Connector (LVDS)**

Pin	Signal Name	Pin	Signal Name
1	VDD_LVDS	2	VDD_LVDS
3	GND	4	GND
5	VDD_LVDS	6	VDD_LVDS
7	LVDS0_D0-(DSI_D0-)	8	LVDS1_D0-
9	LVDS0_D0+(DSI_D0+)	10	LVDS1_D0+
11	GND	12	GND
13	LVDS0_D1- (DSI_D1-)	14	LVDS1_D1-
15	LVDS0_D1+ (DSI_D1+)	16	LVDS1_D1-
17	GND	18	GND
19	LVDS0_D2-(DSI_D2-)	20	LVDS1_D2-
21	LVDS0_D2+(DSI_D2+)	22	LVDS1_D2-
23	GND	24	GND
25	LVDS0_CLK-(DSI_CLK-)	26	LVDS1_CLK-
27	LVDS0_CLK+(DSI_CLK+)	28	LVDS1_CLK+
29	GND	30	GND
31	NC	32	NC
33	GND	34	GND
35	LVDS0_D3-(DSI_D3-)	36	LVDS1_D3-
37	LVDS0_D3+(DSI_D3+)	38	LVDS1_D3+
39	LVDS_PIN39 (PD4.7K to GND)	40	LVDS_CTRL



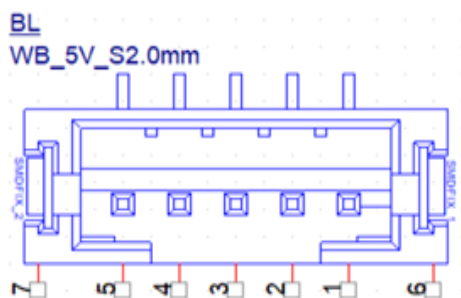
**Figure 2.7 LVDS Connector**

### 2.4.2.7 LVDS Inverter Power Connector (BL)

To avoid damage to the LCD panel, please make sure to set the correct voltage level before applying power while connecting an LVDS panel (refer to the jumper settings for BL and LCD on the datasheet that you will use).

**Table 2.15: LVDS Inverter Power Connector (BL)**

Pin	Description
1	+5V
2	LCD0_BKLT_PWM
3	LCD0_BKLT_EN
4	GND
5	+VDD_BKLT



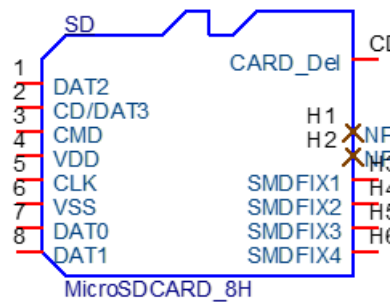
**Figure 2.8 LVDS Inverter Power Connector**

#### 2.4.2.8 Micro SD Slot (SD)

RSB-3730 supports an SD/MMC card, with supported capacity up to 64GB. You can use a SanDisk U1 C10 A1 TF, Kingston U1 A1 V10 switch, SAMSUNG U1 C10 EVO TF card, or Transcend Class4 Micro SDHC card.

**Table 2.16: Micro SD Slot (SD)**

Pin	Signal Name
1	SDCARD_DAT2
2	SDCARD_DAT3
3	SDCARD_CMD
4	+V3.3_SD
5	SDCARD_CLK
6	GND
7	SDCARD_DAT0
8	SDCARD_DAT1
CD	SD2_CD#



**Figure 2.9 Micro SD Slot**

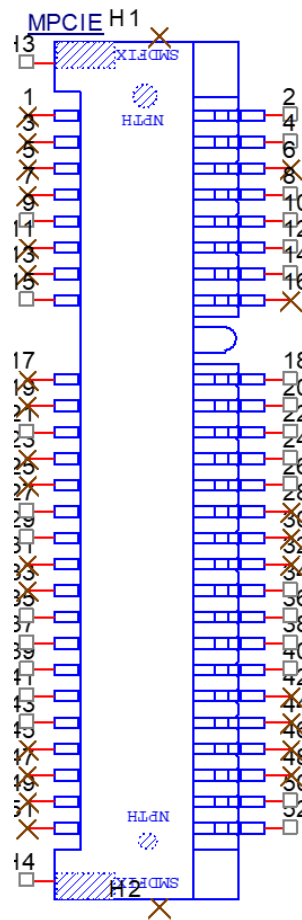


### 2.4.2.9 Mini PCIe (MPCIE)

RSB-3730 supports the Mini PCIe interface. The detailed pin definitions are as shown below.

**Table 2.17: Mini PCIe (MPCIE)**

Pin	Signal Name	Pin	Signal Name
1	NC	2	+V3.3_MINICARD
3	NC	4	MINICARD_DET#_3V3
5	NC	6	NC
7	NC	8	UIM_VCC
9	GND	10	UIM_DATA
11	NC	12	UIM_CLK
13	NC	14	UIM_RESET
15	GND	16	NC
17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	MINICARD_RESET#_3V3
23	NC	24	NC
25	NC	26	GND
27	GND	28	NC
29	GND	30	NC
31	NC	32	NC
33	NC	34	GND
35	GND	36	MINICARD-
37	GND	38	MINICARD+
39	+V3.3_MINICARD	40	GND
41	+V3.3_MINICARD	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	+V3.3_MINICARD



MINIPCIEXPRESS\_52H

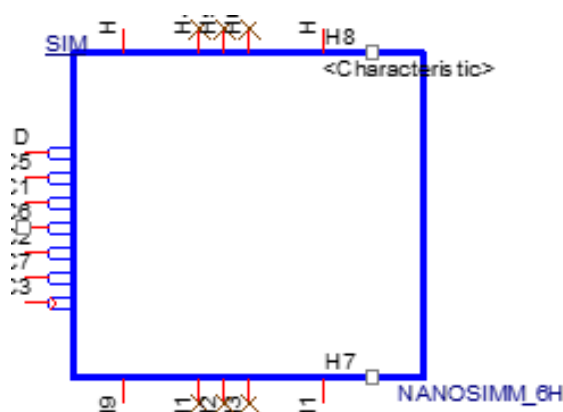
**Figure 2.10 Mini PCIe Connector**

#### 2.4.2.10 NANO SIM Card Slot (SIM)

RSB-3730 supports an on-board NANO SIM socket for 4G integration. Please insert a valid SIM card to connect to a 4G network.

**Table 2.18: NANO SIM Card Slot (SIM)**

Pin	Description
C1	UIM_PWR
C2	UIM_RESET
C3	UIM_CLK
C5	GND
C6	NC
C7	UIM_DATA



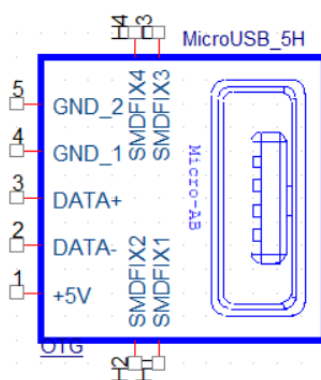
**Figure 2.11 NANO SIM Card Slot**

#### 2.4.2.11 Micro USB Connector (OTG)

RSB-3730 supports one USB OTG port on the coastline.

**Table 2.19: Micro USB Connector (OTG)**

Pin	Description
1	+USB_OTG_5V
2	USB_OTG-_X
3	USB_OTG+_X
4	USB_OTG_ID_X
5	GND



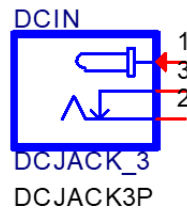
**Figure 2.12 Micro USB Connector**

#### 2.4.2.12 DC Power Jack (DCIN)

RSB-3730 supports a DC-Jack header that can be connected to the 12V DC external power input.

**Table 2.20: DC Power Jack (DCIN1)**

Pin	Description
1	+12V
2	GND
3	GND



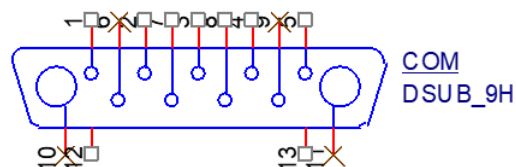
**Figure 2.13 DC Jack**

#### 2.4.2.13 RS232 & RS485 (COM)

RSB-3730 has one RS232 & RS485 DB9 com port. You can select RS232 or RS485 by setenv on uboot.

**Table 2.21: RS232 & RS485 (COM)**

Pin	Description
1	COM_DCD
2	COM_RXD
3	COM_TXD
4	COM_DTR
5	GND
6	NC
7.	COM_RTS
8	COM_CTS
9	NC



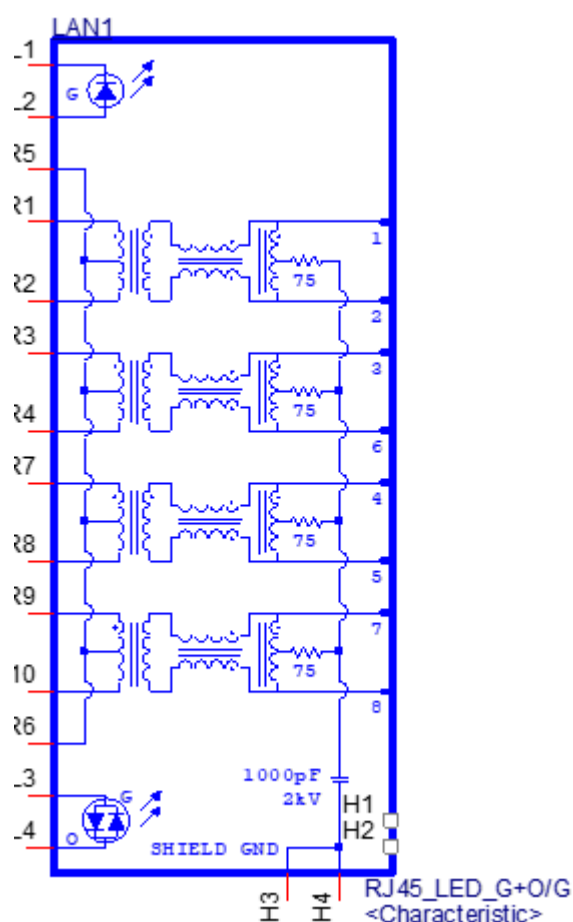
**Figure 2.14 COM**

#### 2.4.2.14 Ethernet Connector (LAN1)

RSB-3730 provides one RJ-45 LAN interface connector, which is compliant with 1000 base-T IEEE 802.3ab, 100 base-TX IEEE 802.3u, and 10 base-T IEEE 802.3. The Ethernet ports provide a standard RJ-45 jack connection with LED indicators on the front side to show Active/Link and speed status.

**Table 2.22: Ethernet Connector (LAN1)**

Pin	Description
R1	LAN1_MDI0+
R2	LAN1_MDI0-
R3	LAN1_MDI1+
R4	LAN1_MDI1-
R5	LAN1CONN
R6	LAN1CONN
R7	LAN1_MDI2+
R8	LAN1_MDI2-
R9	LAN1_MDI3+
R10	LAN1_MDI3-
L1	LAN1_LINK_ACT#
L2	+V3.3
L3	LAN1_LINK1000#
L4	LAN1_LINK100#



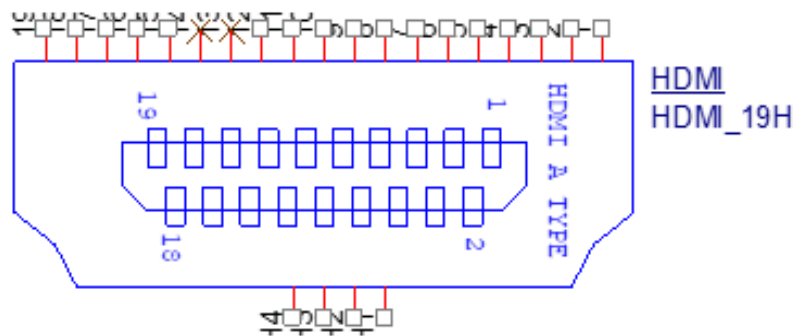
**Figure 2.15 Ethernet Connector**

#### 2.4.2.15 HDMI Connector (HDMI)

RSB-3730 supports one HDMI port. The HDMI pins are defined as shown below.

**Table 2.23: HDMI Connector (HDMI)**

Pin	Description	Pin	Description
1	HDMI_TX2+_C	11	GND
2	GND	12	HDMI1_z_CLK-
3	HDMI_TX2-_C	13	NC
4	HDMI_TX1+_C	14	NC
5	GND	15	HDMI_DDC_SCL
6	HDMI_TX1-_C	16	HDMI_DDC_SDA
7	HDMI_TX0+_C	17	GND
8	GND	18	+5V_HDMI
9	HDMI_TX0-_C	19	HDMI1_HPD
10	HDMI_CLK+_C		



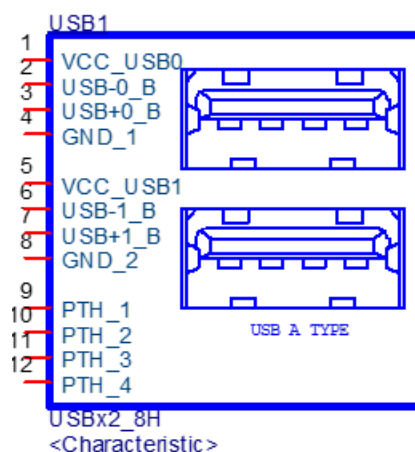
**Figure 2.16 HDMI Connector**

### 2.4.2.16 USB Type-A Connector (USB1)

RSB-3730 supports two standard USB 2.0 Type-A connectors on the coastline.

**Table 2.24: USB Type-A Connector (USB1)**

Pin	Description
1	+V5_USB4
2	USB_z_P4_DM
3	USB_z_P4_DP
4	GND
5	+V5_USB5
6	USB_z_P5_DM
7	USB_z_P5_DP
8	GND
9	GND
10	GND
11	GND
12	GND



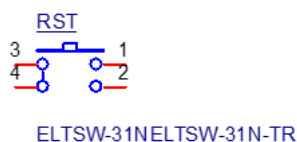
**Figure 2.17 USB Port Connector**

### 2.4.2.17 Reset Button (RST)

RSB-3730 supports a reset button on the coastline.

**Table 2.25: Reset Button (RST)**

Pin	Description
1	RESET_IN#
2	GND
3	GND
4	GND



**Figure 2.18 Reset Button**

2.4.2.18 LEDs

Table 2.26: LEDs	
Name	Description
PWR_LED	Power LED
LED_USER	USER LED

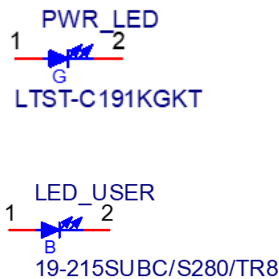




Figure 2.19 LED

2.5 Quick Start

2.5.1 Debug Port Connection

- 1. Connect the debug cable to the RSB-3730 debug port.
- 2. Connect the other end of the debug cable to the USB-to-RS-232 cable. Then connect that cable to your PC.

Table 2.27: Debug Port Connection		
Item	P/N	Picture
Debug Cable	1700021565-11	
Debug Cable	1700026611-01	



## 2.5.2 Debug Port Settings

RSB-3730 can communicate with a host server by 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 RSB-3730 to your PC by using a serial cable.
2. Open HyperTerminal on your Windows PC, and select the settings as shown in Figure 2-7.
3. After the bootloader is programmed on the SD card, connect the power adapter connector to the DC jack on RSB-3730 to power up the board. The bootloader prompt will be displayed on the terminal screen.

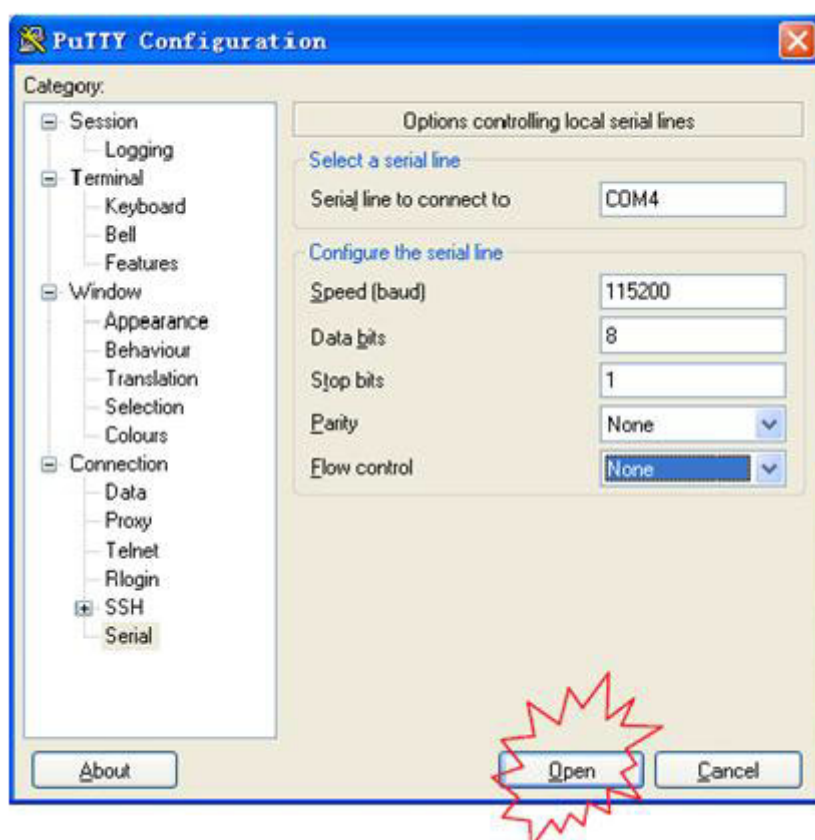


Figure 2.20 HyperTerminal Settings for Terminal Setup



# Chapter 3

## Software Functionality

This chapter details the software programs on the RSB-3730 platform.

## 3.1 Introduction

The purpose of this chapter is to introduce the software development capabilities of RSB-3730, so that you can develop your own application(s) efficiently.

RSB-3730 is designed to support a Linux host only, so you may not be able to develop your application on a Windows/Android host PC. For now, the official supported host Linux version is Ubuntu 18.04 LTS 64-bit; any other version may have compatibility issues. In this case, we strongly recommend having Ubuntu 18.04 LTS 64-bit installed on your host PC before starting RSB-3730 evaluation/development.

## 3.2 Commands

### 3.2.1 Uboot

Commands start with “=>”:

```
=> cat /dev/ttymx0
```

### 3.2.2 Kernel

1. Commands in a single line start with “# ”:

```
# command
```

2. Multi-line commands:

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 simultaneously.

3. Annotations in a single line start with “# #---- ” and end with “ ----# #”:

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

### 3.3 GPIO

The IMX8MM bank/bit notation for GPIOs must be formed as "GPIO<GPIO\_bank>\_<gpio\_bit>".

The numeric value of GPIO is calculated as follows:

$$32 \times (\text{gpio\_bank}-1) + \text{gpio\_bit}$$

gpio\_bit : 0~31

E.g. GPIO5\_22 becomes 150

"GPIO11" and "GPIO12" can be controlled by the CPU or by the i2c extended GPIO based on the high and low levels of "GPIO\_SELECT".

**Table 3.1: GPIO**

GPIO Number	GPIO Formed	Numeric Representation
GPIO1	GPIO5_22	150
GPIO2	GPIO5_23	151
GPIO3	GPIO5_24	152
GPIO4	GPIO5_25	153
GPIO5	GPIO3_21	85
GPIO6	GPIO5_13	141
GPIO7	GPIO5_10	506
GPIO8	GPIO5_12	140
GPIO9	GPIO5_11	511
GPIO10	GPIO4_28	138
<hr/>		
GPIO_SELECT= LOW	GPIO3_19	83
GPIO11	GPIO1_0	0
GPIO12	GPIO4_1	97
<hr/>		
GPIO_SELECT= HIGH	GPIO3_19	83
GPIO11	I2C_GPIO P0	504
GPIO12	I2C_GPIO P1	505
<hr/>		
GPIO_LED	I2C_GPIO P3	507

Export GPIO; then you can use control GPIO from the user space through sysfs.

The node numbers of the exported GPIO are consistent with the export order, increasing from 1.

Export GPIO1.

```
# echo 150> /sys/class/gpio/export
```

Set GPIO direction to in/out.

```
# echo "out" > /sys/class/gpio/gpio1/direction
```

Set GPIO value 0/1 if GPIO pin definition as output.

```
# echo 1 > /sys/class/gpio/gpio1/value
```

Get GPIO value.

```
# cat /sys/class/gpio/gpio1/value
```

## 3.4 UART

The Linux UART/serial port access from the user is through the tty-devices. The tty-devices have different names depending on the UART driver on different boards.

RS-485 uses half-duplex communication, which means that one medium is shared for transmitting and receiving data. Therefore, the system needs to control the RS-485 transceiver's transmit mode. Usually the UART RTS signal is used to switch the transmitter on and off.

### 3.4.1 RSB-3730 UART

**Table 3.2: RSB-3730 UART**

COM Name	Device Node	Remark
UIO2 com1	/dev/ttymx0	supports RS232
COM1/DEBUG2	/dev/ttymx1	Debug Port
COM	/dev/ttymx2	supports RS232/RS485
UIO2 com4	/dev/ttymx3	supports RS232

### 3.4.2 How to Configure RS232 or RS485 Mode

Enter U-boot interrupt mode.

Connect the device to the debug port, and open the debug console.

Press "Ctrl + C" before powering up the device until you get the following information on the debug console:

```
Hit any key to stop autoboot: 0
=> <INTERRUPT>
=>
```

Then you can input the following command to configure UART mode:

#### RS485 Mode:

```
=> setenv uart_mode 2:1
=> saveenv
=> reset
```

#### RS232 Mode:

```
=> setenv uart_mode 2:0
=> saveenv
=> reset
```

Note: The default value is RS232.

The above command "setenv uart\_mode 2:1", 2:1 means to set ttymx2 to RS485 standard mode, and 2:0 means to set ttymx2 to RS232 mode.

The following RS232 testing method is shared by "/dev/ttymx0, /dev/ttymx2, /dev/ttymx3", and only needs to be replaced by the UART Name.

### RS232- Loopback Test

```
# stty -F /dev/ttymx0 -echo -onlcr 115200
# cat /dev/ttymx0 &
# echo "Serial Port Test" > /dev/ttymx0
```

### RS-485 Test

Test RS-485 with ADAM-4520I. Connect Adam-4520I to the PC with a DB9 cable. Connect ADAM-4520I to COMX DB9.

```
# stty -F /dev/ttymx2 speed 115200 ignbrk -brkint \
  -icrnl -imaxbel -opost -onlcr -isig -icanon \
  -iexten -echo -echoe -echok -echoctl -echoke
# cat /dev/ttymx2 &
# echo test > /dev/ttymx2
```

Receive "test" on the PC terminal.

## 3.5 Audio

1. Check the audio codec.

```
# cat /proc/asound/cards
0 [sgtl5000      ]: sgtl5000 - sgtl5000
                    sgtl5000
```

2. Audio codec (sgtl5000):

- a. Set MIC and headphone:

```
# amixer set Mic 32% Simple mixer
control 'Mic',0
Capabilities: volume volume-joined Playback
channels: Mono
Capture channels: Mono Limits: 0 - 3
Mono: 1 [33%] [20.00dB]

# amixer set Lineout 100% Simple mixer
control 'Lineout',0
Capabilities: pvolume
Playback channels: Front Left - Front Right Limits:
Playback 0 - 31
Mono:
Front Left: Playback 31 [100%] [0.00dB]
Front Right: Playback 31 [100%] [0.00dB]

# amixer set PCM 100%
Simple mixer control 'PCM',0
Capabilities: pvolume
Playback channels: Front Left - Front Right Limits:
Playback 0 - 192
Mono:
Front Left: Playback 192 [100%]
Front Right: Playback 192 [100%]
```

b. Record and playback:

```
# arecord -t wav -c 1 -r 44100 -d 5 /tmp/mic.wav
# aplay /tmp/mic.wav
```

## 3.6 I<sup>2</sup>c Test

Check the i<sup>2</sup>c device (audio codec: 0-000a).

```
root@imx8mmrsb3730a2:~# i2cdetect -y 4
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  -- -- -- -- -- -- -- -- UU -- -- -- --
10:  -- -- -- -- -- -- -- -- -- -- -- -- --
20:  -- -- -- -- -- -- -- -- -- -- -- -- --
30:  -- -- -- -- -- -- -- -- -- -- -- -- --
40:  -- -- -- -- -- -- -- -- -- -- -- -- --
50:  -- -- -- -- -- -- -- -- -- -- -- -- --
60:  -- -- -- -- -- -- -- -- -- -- -- -- --
70:  UU -- -- -- -- -- -- --
```

I<sup>2</sup>c set and get

```
root@imx8mmrsb3730a2:~# i2cset -f -y 4 0x0a 0 0xff00 w
root@imx8mmrsb3730a2:~# i2cget -f -y 4 0x0a 0 w
0x11a0
```

## 3.7 SD/MMC Card/USB/SpiFlash

### 3.7.1 Device Routes

eMMC: /dev/mmcblk2

SD: /dev/mmcblk1

QSPI: /dev/mtd0

For example: SD test

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

### 3.7.2 USB Disk Test

```
root@imx8mmrsb3730a2:~# lsusb -t
/: Bus 01.Port 1: Dev 1, Class=root_hub, Driver=ci_hdrc/lp, 480M
   |-- Port 1: Dev 2, If 0, Class=Hub, Driver=hub/7p, 480M
       |-- Port 1: Dev 7, If 0, Class=Mass Storage, Driver=usb-storage, 480M
       |-- Port 2: Dev 9, If 0, Class=Mass Storage, Driver=usb-storage, 480M
       |-- Port 3: Dev 6, If 0, Class=Vendor Specific Class, Driver=smc75xx, 480M
       |-- Port 4: Dev 8, If 0, Class=Mass Storage, Driver=usb-storage, 480M
       |-- Port 5: Dev 10, If 0, Class=Mass Storage, Driver=usb-storage, 480M
root@imx8mmrsb3730a2:~#
```



## 3.8 RTC

1. Disable RTC sync service.

```
# systemctl disable ntpd.service
Removed /etc/systemd/system/multi-user.target.wants/ntpd.service.
# systemctl stop systemd-timesyncd
# systemctl stop ntpdate.service
```

2. Set system time to current, then write to RTC.

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

3. Set one incorrect time, then read the time from RTC to verify.

```
# date 010100002000 && hwclock -r && date
Sat Jan 1 00:00:00 UTC 2000
2016-02-17 10:45:06.361513+00:00
Sat Jan 1 00:00:00 UTC 2000
```

4. Restore the RTC time to system time.

```
# hwclock -s && date
Wed Feb 17 10:45:13 UTC 2016
```

## 3.9 Watchdog

System will reboot after 1 sec.

```
# /unit_tests/Watchdog/wdt_driver_test.out 1 2 0

---- Running < /unit_tests/Watchdog/wdt_driver_test.out > test ----

Starting wdt_driver (timeout: 1, sleep: 2, test: ioctl) Trying to set time out value=1 seconds
The actual timeout was set to 1 seconds
Now reading back -- The timeout is 1 seconds
```

## 3.10 HDMI

### 3.10.1 HDMI Resolution

#### 3.10.1.1 HDMI

When the HDMI cable is connected, the default resolution from EDID will be displayed on the screen.

#### 3.10.1.2 Check Different Resolutions:

Get “connect ID” and “support resolutions”.

```
# modetest -c
```

```
id  encoder status  name  size (mm)  modes encoders
46  45   connector  HDMI-A-1  510x290  8   45
modes:
  name refresh (Hz) hdisp hss hse htot vdisp vss vse vtot
1920x1080 60 1920 2008 2052 2200 1080 1084 1089 1125 148500 flags: phsync, pvsync; type: pre-ferred, driver
1920x1080 50 1920 2448 2492 2640 1080 1084 1089 1125 148500 flags: phsync, pvsync; type: driver
1280x720 60 1280 1390 1430 1650 720 725 730 750 74250 flags: phsync, pvsync; type: driver
1280x720 50 1280 1720 1760 1980 720 725 730 750 74250 flags: phsync, pvsync; type: driver
1440x576 50 1440 1464 1592 1728 576 581 586 625 54000 flags: nhsync, nvsync; type: driver
1440x480 60 1440 1472 1596 1716 480 489 495 525 54000 flags: nhsync, nvsync; type: driver
720x576 50 720 732 796 864 576 581 586 625 27000 flags: nhsync, nvsync; type: driver
720x480 60 720 736 798 858 480 489 495 525 27000 flags: nhsync, nvsync; type: driver props:
```

## 3.11 LVDS

### 3.11.1 LVDS- Panel

Press enter after boot. The system will stop at u-boot as below. Issue the command in red and press enter.

Set the resolution to 800x480 (Ex: G070VW01 panel).

```
=> setenv fdt_file imx8mm-rsb3730-a2-dsi2lvds-800x480.dtb
=> saveenv
=> boot
```

Set the resolution to 1920x1080 (Ex: G215HV01 panel).

```
=> setenv fdt_file imx8mm-rsb3730-a2-dsi2lvds-1920x1080.dtb
=> saveenv
=> boot
```

### 3.11.2 MIPI DSI Panel: G101UAN02.0

```
=> setenv fdt_file imx8mm-rsb3730-a2-dsi-auog101uan02.dtb
=> saveenv
=> boot
```

## 3.12 TPM

1. Check the i2c device( tpm : 1----0x2e)

```
# i2cdetect -r -y 1
```

```

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

```

2. I2c set and get.

```
# i2cset -f -y 1 0x2e 0x00 0x3f
# i2cget -f -y 1 0x2e 0x00
0x3f
```



# Chapter 4

## Network Setup

## 4.1 Wi-Fi Setup

1. Insmod module (CM276 pcie+uart).

```
# modprobe mlan_5x17283_pcie_8997
# modprobe moal_5x17283_pcie_8997 drv_mode=1 \
  cal_data_cfg=none cfg80211_wext=0xf \
  fw_name=nxp/pcieuart8997_combo_v4_5x17283.bin
```

2. Choose ESSID, input password.

```
# killall wpa_supplicant
# ifconfig wlan0 up
# wpa_passphrase "SSID" "PASSWORD" > /tmp/wpa.conf
# wpa_supplicant -d -B -i wlan0 -c /tmp/wpa.conf -Dnl80211
# udhcpc -i wlan0
```

3. Check the connection. Enter the "ifconfig" command to view the IP addresses that can be obtained.

```
# ping -I wlan0 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=54 time=2.10 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=54 time=2.10 ms
```

## 4.2 BT

After the first step "Insmod module" in Chapter 4.1.

```
# hciattach /dev/ttymx0 any 115200 flow
# sleep 0.2
# hciconfig hci0 up
# hcitool -i hci0 cmd 0x3f 0x0009 0xc0 0xc6 0x2d 0x00
# sleep 0.2
# killall hciattach
# sleep 0.2
# hciattach /dev/ttymx0 any -s 3000000 3000000 flow
# sleep 0.2
# hciconfig hci0 up
# hcitool scan
```

## 4.3 4G

1. Insert a SIM card and restart.

```
# quectel-CM &
```

2. Wait for the IP address to appear. Test the network.

```
# ping -I wwan0 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=54 time=2.10 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=54 time=2.10 ms
```

## 4.4 Ethernet

RSB-3730 supports two Ethernet connections (eth0 and eth1).

```
root@imx8mmrsb3730a2:~/pcba_test# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0b:ab:11:22:33
          inet addr:172.21.170.60  Bcast:172.21.171.255  Mask:255.255.254.0
          inet6 addr: fe80::20b:abff:fe11:2233/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:119  errors:0  dropped:0  overruns:0  frame:0
          TX packets:73  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:13363 (13.0 KiB)  TX bytes:10918 (10.6 KiB)

eth0:0    Link encap:Ethernet  HWaddr 00:0b:ab:11:22:33
          inet addr:192.168.0.1  Bcast:192.168.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:730  errors:0  dropped:0  overruns:0  frame:0
          TX packets:730  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:45836 (44.7 KiB)  TX bytes:45836 (44.7 KiB)
```

When there is access to the second network module eth1.

```
root@imx8mmrsb3730a2:~# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0b:ab:11:22:33
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:6192  errors:0  dropped:0  overruns:0  frame:0
          TX packets:581  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:497305 (485.6 KiB)  TX bytes:114013 (111.3 KiB)

eth1      Link encap:Ethernet  HWaddr 74:fe:48:46:bb:dd
          inet addr:172.21.170.73  Bcast:172.21.171.255  Mask:255.255.254.0
          inet6 addr: fe80::76fe:48ff:fe46:bbdd/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST DYNAMIC  MTU:1500  Metric:1
          RX packets:23  errors:0  dropped:0  overruns:0  frame:0
          TX packets:19  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2664 (2.6 KiB)  TX bytes:3628 (3.5 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:174  errors:0  dropped:0  overruns:0  frame:0
          TX packets:174  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:14566 (14.2 KiB)  TX bytes:14566 (14.2 KiB)
```

---

## 4.5 Installing the System from an SD Card

1. Copy imx-image-full-imx8mmrsb3730a2-xxxxxx.rootfs.sdcard package to your desktop. Use ubuntu OS.
2. Insert the SD card into the PC.
3. Make a bootable SD card. For example, the node of an SD card is /dev/sdv.

```
# umount /dev/sdv*
# dd if=./imx-image-full-imx8mmrsb3730a2-xxxx.rootfs.sdcard \
  of=/dev/sdv bs=1M
# sync
```

4. Insert the SD card and copy imx-image-full-imx8mmrsb3730a1-xxxxxx.rootfs.sdcard to a USB disk.
5. Insert the USB disk and SD card, then boot the whole system from the SD card by changing SW1 to 1-2 ON.
6. Enter the usb disk folder, and make a bootable emmc.

```
# cd /run/media/sda1/
# umount /dev/mmcblk2*
# dd if=./imx-image-full-imx8mmrsb3730a2-xxxx.rootfs.sdcard \
  of=/dev/mmcblk2 bs=1M
# sync
```

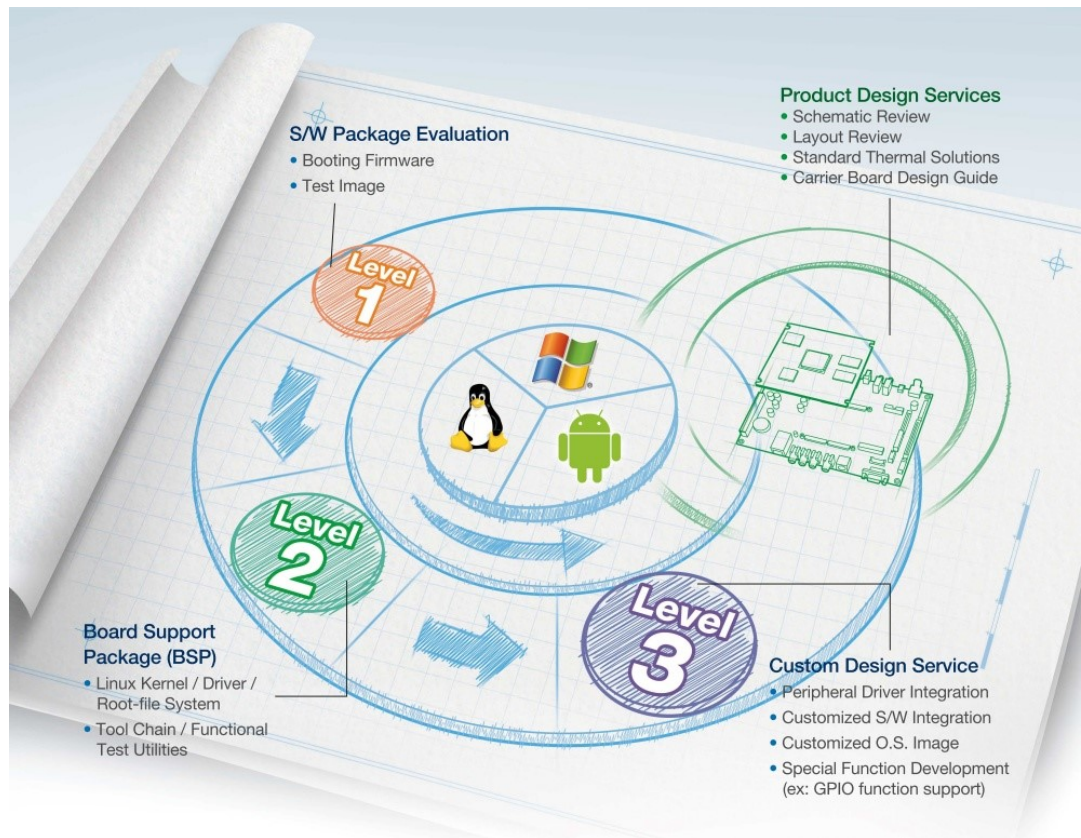


# Chapter 5

## Advantech Services

This chapter introduces the Advantech Design-In service, technical support, and warranty policy for the RSB-3730 evaluation kit.

## 5.1 RISC Design-In Services



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

### Easy Development

Advantech has support firmware, a root file-system, BSP, and other development tools for customers. These tools help customers easily develop their carrier boards and differentiate their embedded products and applications.

- Full Range of RISC Product Offerings
- Comprehensive Documentation Support

### Design Assistance Service

Advantech provides a checklist for engineers to easily check their schematics and also review them based on customer carrier board schematics. These services are preventative, and help catch design errors before they occur. It helps to save a lot of time and cost with regard to developing carrier boards.

- Schematic Review
- Placement and Layout Review
- Debugging Assistance Services
- General/Special Reference Design Database

### Thermal Solution Services

We provide services to assist customers with quicker and more flexible solutions for thermal design. Advantech provides thermal solution services including modularized thermal solutions and customized thermal solutions.

- Standard Thermal Solutions
- Customized Thermal Solutions

### Embedded Software Services

These services are to provide driver support, software integration or customized firmware, root file-system, and Linux images. This enables customers to save a lot of time and focus on core development.

- Embedded Linux/Android OS
- Advantech Bootloader Customization

With the spread of industrial computing, a whole range of new applications has been developed, resulting in a fundamental change in the IPC industry. In the past, System Integrators (SI) were used to complete projects without outside assistance, but now such working models have been left behind. Due to diverse market demands and intense competition, cooperation for vertical integration (both upstream and downstream) 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 module 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 has found that customers usually have the following concerns when implementing modular designs.

#### General I/O design capability

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

#### 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 difficult problems dealing with platform design in general and communicating with CPU or chipset manufacturers, thereby increasing carrier board design difficulties and risk as well as seriously impacting time-to-market, possibly resulting in lost 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 systems 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, SIs still have to make a lot of effort to integrate them into the system core. Moreover, the BSPs provided by CPU manufacturers are usually for carrier board design, so it's difficult for SIs to have an environment for software development.

In view of this, Advantech proposed the concept of Streamlined Design-in Support Services for RISC-based Computer-on-Modules (COM). With a dedicated professional design-in services team, 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 Freescale, Advantech helps solve communication and technical support difficulties, and that can reduce the uncertainties of product development, too. Advantech's professional software team also focuses on providing a complete Board Support Package and assists customers to build up a software development environment for their RISC platforms.

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

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

### **Planning stage**

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process, including 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 evaluation board to assess RISC modules and test peripheral hardware. What's more, Advantech provides a standard software Board Support Package (BSP) for RISC COM, so that customers can define their product's specifications as well as verify 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, BT). Resolving customer concerns is Advantech's main target at this stage. Since we all know that product evaluation is the key task during the planning period, especially for performance and specifications, 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 design guide for the carrier board for reference. The carrier board design guide provides pin definitions of the COM connector with limitations and recommendations for carrier board design, so customers can have clear guidelines to follow during carrier board development. Regarding different form factors, Advantech offers a complete pin-out checklist 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 in reviewing the placement/layout and schematics to ensure the carrier board design meets their full requirements. For software development, the Advantech RISC software team can assist customers to establish an environment for software development and evaluate the amount of time and resources needed. If customers outsource software development to a 3rd party, Advantech can also cooperate with the 3rd party and provide proficient consulting services. With Advantech's professional support, the design process becomes much easier and product quality will be improved to meet targets.

### Integration stage

This phase comprises of 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 has a lot to do with driver design on carrier boards. RISC platforms usually have less support for ready-made drivers on the carrier board. Therefore, the customer has to learn from trial and error and to finally arrive at the best solution with the least effort. Advantech's team has years of experience in customer support and HW/SW development. Consequently, we can support customers with professional advice and information as well as shortening development time and enabling more effective product integration.

### Validation stage

After a customer's ES sample is completed, the next step is a series of verifications. 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.

In a supportive role, Advantech primarily 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 little fuss. Furthermore, Advantech's team provides professional consulting services regarding further testing and equipment usage, so customers can find the right tools to efficiently identify and solve problems to further enhance the quality and performance of their products.

## 5.2 Contact Information

Below is the contact information for Advantech customer service.

Region/Country	Contact Information
USA	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

Additionally, you can reach our service team through the below website. Our technical support engineers will provide quick responses once the form is filled out:

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

## 5.3 Global Service Policy

### 5.3.1 Warranty Policy

Below is the warranty policy of ADVANTECH products.

#### 5.3.1.1 Warranty Period

ADVANTECH-branded off-the-shelf products and 3rd-party off-the-shelf products used to assemble ADVANTECH Configure-to-Order products are entitled to 2 years of 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 the sales contract.

All 3rd-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) during the first 30 days after purchase, through your original ADVANTECH supplier to arrange DOA replacement if the products were purchased directly from ADVANTECH and the product is DOA (dead on arrival). The DOA cross-shipment excludes any shipping damage, 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 at the customer's expense. The shipping fees for reconstructed products from ADVANTECH back to customers' sites will be at 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.
- The 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 there is 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 lightning strike, flood, earthquake, etc.
- There are 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 RMA (Return Merchandise Authorization) 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 website: <http://erma.advantech.com.tw> with an authorized user ID and password.

You must fill out basic product and customer information and describe the problems encountered in detail in the "Problem Description" section. Vague entries such as "does not work" and "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 in 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 the Product for Repair

It's possible customers can save time and meet end-user requirements by returning defective products to an authorized ADVANTECH repair facility without an extra cross-region charge. It is required to contact the local repair center before receiving a global repair service.

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

European Customers that are located outside the European Community are requested to 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 the clearance time of goods:

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 the phrase "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 the country of origin of the goods.

In addition, please attach an invoice with the RMA number to the carton, 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 unrepaired items at the customer's cost if inappropriately packed.



For other situations, "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 used.

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 there is failure caused 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 lightning strike, flood, earthquake, etc.
- Product updates and tests were done upon the request of customers who are without warranty.

If a product has been repaired by ADVANTECH, and within three months after such a repair, the product requires another repair for the same problem, ADVANTECH will perform 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; been improperly maintained by the customer; or there is failure caused for which ADVANTECH is not responsible, whether by accident or other cause.

Please contact your nearest regional service center for a detailed service quotation.

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 a 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 the 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, etc. The customer must bear the extra costs of such alternative shipments. If you require any special arrangements, please indicate this when shipping the product to us.





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Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

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