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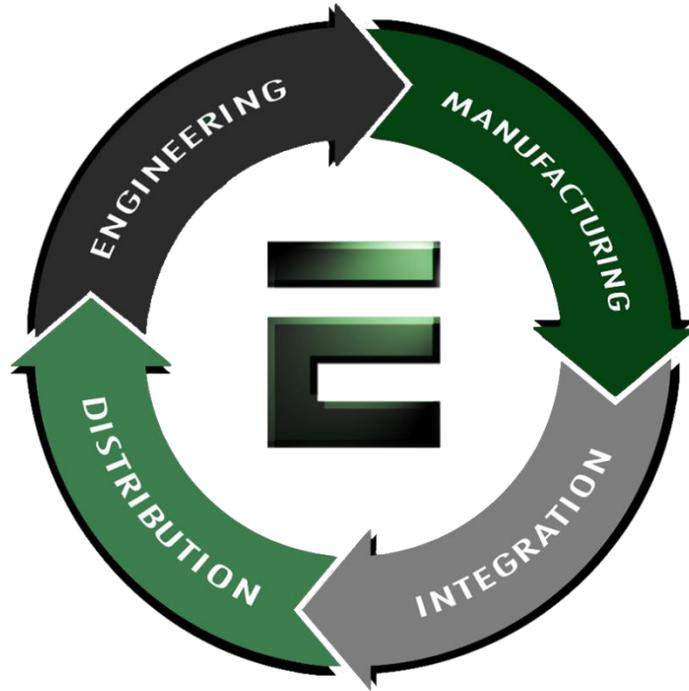
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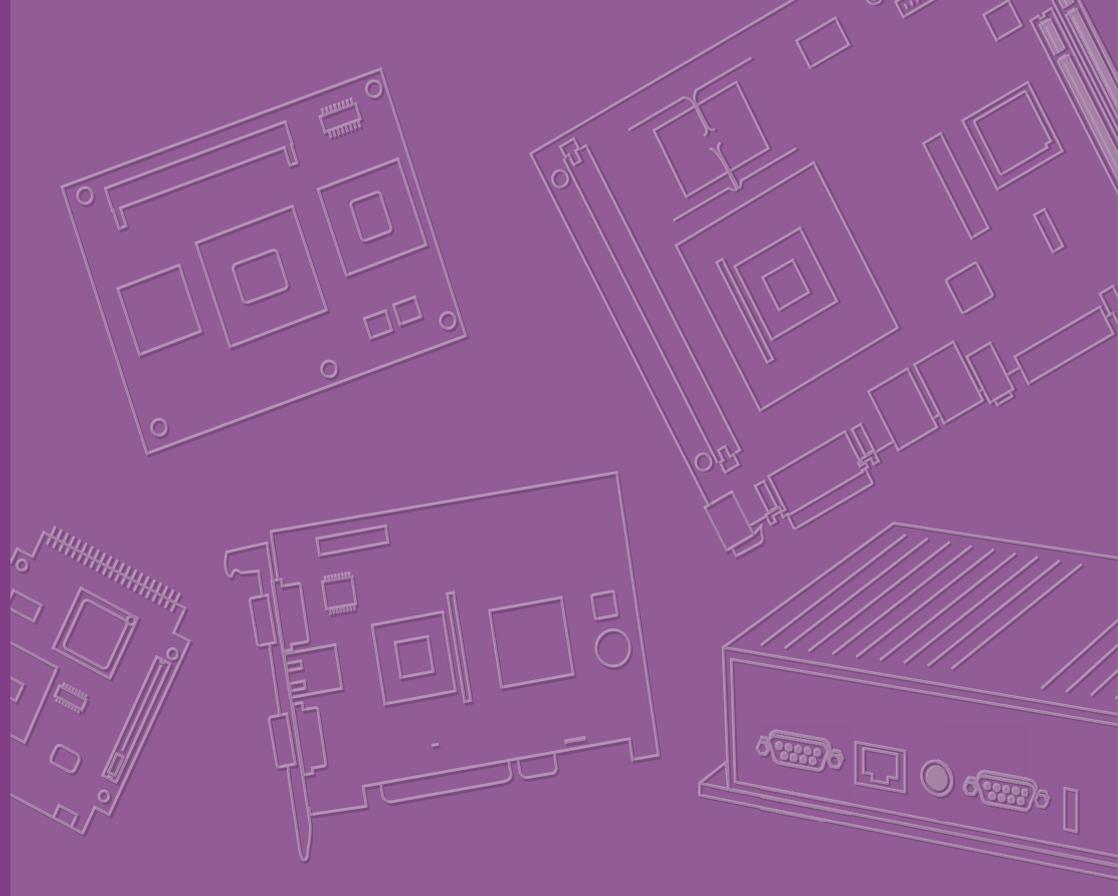
User Manual

RSB-4710

3.5" Single-Board Computer with Rockchip Arm® Cortex®-A72 Processor

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2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
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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 when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference. In such cases, users are required to correct the interference at their own expense.

Packing List

Before installation, ensure that the following items have been shipped:

■ 1 x RSB-4710 SBC

Safety Precautions – Static Electricity

Follow this simple precaution 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 when the PC is powered on.

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 qualified 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.

Ordering Information

Part Number	Description
RSB-R4710CO-XNA1E	RSB-4710 2GDDR,16GB eMMC, 0 ~ 60 °C/32 ~ 140 °F
RSB-R4710WO-XNA1E	RSB-4710 2GDDR,16GB eMMC, -20 ~ 85 °C/-4 ~ 185 °F
RSB-R4710CO-XLA1E	RSB-4710 2GDDR,16GB eMMC, lite, 0 ~ 60 °C/32 ~ 140 °F
RSB-R4710WO-XLA1E	RSB-4710 2GDDR,16GB eMMC, lite, -20 ~ 85 °C/-4 ~ 185 °F

Optional Accessories

Part Number	Description
96PSA-A36W12R1-3	ADP A/D 100-240V 36W 12V C6 DC plug 90°
96PSA-A36W12W7-5	ADP A/D 100-240V 36W 12V C6 lock DC jack 62368
1700024849-01	Power cord BSMI 3P 2.5A 125V 180cm
1702002605	Power cord 3P EU 10A 250V 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
1700021565-01	Debug cable
IDK-1107WR-40WVA1E	7" LED PANEL 400N with 4WR touch, 800x480(G)
1700031071-01	For IDK-1107WR LVDS and black light cable
IDK-1115R-40XGC1E	15" LED panel 1024x768(G) with 5W R-touch
1700031073-01	For IDK-1115R LVDS and black light cable
IDK-1121WR-30FHA1E	21.5",1920x1080,300nit,Part No. 97.21G01.001-S03
1700031072-01	For IDK-1121WR LVDS and black light cable
XUTC-B156XTN07.1	AUO 15.6", 1366 x 768, 220nits, for UTC project
1700031103-01	For B156XTN07.1 eDP and black light cable
EWM-W188M201E	Wi-Fi 802.11ac/abgn 2T2R and BT4.2
1750007965-01	Antenna Cable R/P SMA (M) to MHF4, 300mm
1750008671-01	Dipole Ant.SMA/M-R 2.4/5G 2.5/4dBi BLK 109mm
968AD00479*	4G module LTE Cat 4 for China
1750006264	Antenna cable SMA(F)/MHF 15cm
1750007990-01	Antenna 4G/LTE full band L=11 cm 50 Ohm
SQF-MSDM1-8G-21C	SQF micro SD C10 MLC 8G (-25 ~ 85 °C/-13 ~ 185 °F)

*Contact Advantech to obtain a suitable cellular module for your region.

Contents

Chapter 1

General Introduction

This chapter gives background information regarding RSB-4710.

■ Introduction
■ Specification

1.1 Introduction

RSB-4710 is a RISC-based 3.5" single-board computer (SBC) powered by a high-performance Rockchip RK3399 Arm® dual Cortex-A72 and quad Cortex-A53 processor that supports 4K resolution via HDMI. RSB-4710 offers dual HDMI/LVDS/eDP output and extensive I/O, including 2 x GbE, 6 x serial ports, 6 x USB, and 5 x GPIO, as well as 1 x mini PCIe, 1 x M.2, and 1 x SIM card slot for integrating Wi-Fi, Bluetooth, and 3G/4G modules. RSB-4710 provides the ideal system for kiosk, POS, and vending machine applications.

1.1.1 Product Features

Specifications		RSB-4710 Standard	RSB-4710 Lite
Form Factor		3.5" SBC	
Processor	CPU	RK3399/RK3399K dual-core Cortex-A72 and quad-core Cortex-A53 1.8 GHz	
Memory	Technology	LPDDR4	
	Capacity	Onboard 2GB	
	Flash	16GB eMMC NAND Flash for OS	
Display	LVDS	1	-
	HDMI	2, (4K 60fps + 1080P)	1
	VGA	-	
	eDP	1	1
	Graphics Engine	OpenGL ES 1.1/2.0/3.1, OpenCL 1.1, DirectX 11	
	H/W Video Codec	Decoder: MPEG-1, MPEG-2, MPEG-4, H.263, H.264, AVS, VC-1, VP8, MVC, HEVC/H.265 decoder, 4k@60FPS Encoder: H.264 (BP@level4.0, MP, HP@level4.0), MVC and VP8	
Video In	MIPI CSI	1	
Ethernet	Chipset	RTL8211FS	
	Speed	2 10/100/1000 Mbps	1 10/100/1000 Mbps
Watchdog Timer		0 ~ 60s, default 30s	
I/O	SATA	-	
	SATA Power	-	
	USB	1 x USB 3.0, 1 x USB 2.0 TypeA, 3 x USB 2.0 by pin header, 1 x USB OTG	
	Audio	1 x Line-Out /Mic-In/Line-In/Speaker by pin header	
	Serial Port	2 x RS-232 w/2-wires 2 x RS-232 and 2 x RS-232/ 1 x RS-232, 1 x RS-232 485 w/4-wires	
	SPI	1	
	CAN	-	
	GPIO	5	
	I2C	1	
	Button	1 x Reset button	
Indicator	LED	1 x Green LED for system power	

Expansion	Mini-PCIe	1 x w/ USB 2.0 signal	
	M.2	1 x E-Key 2230, w/ SDIO/UART/USB/PCIe signal	
	SD	1 x micro SD	
	SIM	1 x nano SIM	
Power	Power Supply Voltage	12V DC-in	
	Power Type	DC-in	
	Power Consumption	Boost 15W@12V	
Environment	Operating Temperature	0 ~ 60 °C/32 ~ 140 °F -20 ~ 85 °C/-4 ~ 185 °F	0 ~ 60 °C/32 ~ 140 °F -20 ~ 85 °C/-4 ~ 185 °F
	Operating Humidity	5 ~ 95% Relative Humidity, non-condensing	
Mechanical	Dimensions (W x D x H)	146 x 102 x 20 mm/5.74 x 4.01 x 0.78 in	
Operating System		Android7.1, Linux Debian	
Certifications		CE/FCC	

1.1.2 Mechanical Specifications

- Dimensions: 146 x 102 mm/5.74 x 4.01 in
- Height: 20 mm/0.78 in
- Reference Weight: 0.32 kg/0.70 lb

1.1.3 Electrical Specifications

- Power Supply Type: DC-in 12V
- RTC Battery:
  - Typical voltage: 3V
  - Normal discharge capacity: 210mAH

1.1.4 Environmental Specifications

- Operating Temperature: 0 ~ 60 °C/32 ~ 104 °F; -20 ~ 85 °C/-4 ~ 185 °F
- Operating Humidity: 5 ~ 95% relative humidity, non-condensing
- Storage Temperature: -40 ~ 85 °C/-40~185 °F
- Storage Humidity: 60 °C/140 °F @ 95% RH non-condensing

1.1.5 Block Diagram

2GB LPDDR4		16GB eMMC

Ethernet ↔ RTL8211E → RGMII

Ethernet ← LAN7500 → USB 2.0

Micro OTG ↔ USB 2.0 OTG

1 x USB 3.0/2.0 Type A ↔ USB 3.0

M.2 ↔ SDIO/UART0 PCIe

Mini PCIe ←

Nano SIM

USB251 7-JZX ↔ USB host 2.0

3 x USB 2.0 ←

2 x RS-232/485 ↔ FT4232

2 x RS-232 ←

Rockchip RK3399 Dual Cortex-A72 & Quad Cortex-A53

HDMI ↔ HDMI Out

DP → CH7525 → HDMI Out

eDP ↔ eDP

MIPI0 DSI → TC358775 → LVDS

MIPI2 CSI ← MIPI CSI

I2S ↔ ALC5660 → Mic In/Line In Line Out/Speaker

UART2 ↔ Transceiver → RS-232/debug

UART4 ↔ Transceiver → RS-232

I2C/SPI ↔ I2C/SPI

GPIO ↔ 5 x GPIO

SDIO ↔ Micro SD

Chapter 2

Hardware Installation

This chapter provides mechanical and connector information.

- ■ Jumper Information
- ■ Connector Information
- ■ Mechanical Drawing
- ■ Quick Start Guide

2.1 Jumper and Connector Locations

- OTG USB OTG
- LAN2
- LAN1
- USB1 USB2.0+ USB3.0
- HDMI2
- HDMI1
- COM1 RS232
- DCIN1 12VDC

- J1 COM5/6 Impedance
- OCM34 RS232x2
- OCM56 RS232/485x2
- J3 COM3/4 12/5V select
- BTN LED POWER BTN
- SD slot
- M.2 E-Key
- SIM slot
- Mini-PCIE

- COM2/DEBUG RS232/Debug
- USB2 USB2.0x2
- USB3 USB2.0x1
- VDD3 LVDS VDD 3.3/5V
- SW1 AT & ATX switch
- J4 COM2 RS232/ debug
- VDD1 eDP VDD 3.3/5V

- BL LVDS BKL
- Mipi CSI
- LVDS
- EDP
- Audio

- BLP1 LVDS BKL 3.3/5V
- BLP2 LVDS BKL 12V

- CN2 I2Cx1
- CN1 SPIx1
- CN3 GPIOx5

2.2 Board Dimensions

2.3 Jumpers

2.3.1 Jumper Description

Cards can 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, connect the pins with the clip. To open a jumper, remove the clip. Sometimes a jumper will have three pins labeled 1, 2, and 3. In such cases, connect either pins 1 and 2 or pins 2 and 3.
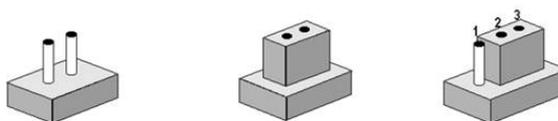
The jumper settings are schematically depicted in this manual as follows:

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 making any changes. Generally, only a standard cable is required 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	
J4	COM2 RS-232 and debug mode select, default debug mode
J3	COM3,COM4 power 12/5V level select, default 5V
J1	COM5, COM6 impedance select, default off
SW1	AT & ATX Mode Switch, default AT mode
VDD3	LVDS VDD 3.3V &5V level select, default 3.3V
BLP1	LVDS BKL PWR 3.3V&5V level select, default off
BLP2	LVDS BKL PWR 12V select, default 12V
VDD1	EDP VDD 3.3V &5V level select, default 3.3V

2.3.3 Jumper Settings

2.3.3.1 J4

RSB-4710 COM2 can be used as RS-232 or a debug port via J4 selection.

J4	UART2 used for COM port and debug mode select
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	Pin header 3 x 1P 2.0 mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	Debug port
(2-3)	RS232

This pin header is designed for selecting the COM port and debug mode.

PH_3x1V_2.00mm
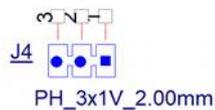
2.3.3.2 J3

RSB-4710 supports 12/5V power supply via COM5 and COM6. The power level can be selected via J3.

| J3	COM5 and COM6 power 12/5V level select
Part number	1653003101
Footprint	HD_3x1P_79_D
Description	Pin header 3 x 1P 2.0 mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	5V
(2-3)	12V

This pin header is designed for COM5 and COM6 power selection.

PH_3x1V_2.00mm
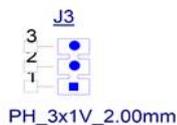
2.3.3.3 J1

RSB-4710 COM5 and COM6 can be used as RS-232 or RS-485 via software configuration, refer to Section 3.4. When set as RS-485, the impedance can be configured on/off.

J1	COM5 and COM6 RS-485 impedance on/off
Part Number	1653003201-01
Footprint	HD_3x2P_79_D_PRX
Description	Pin header 2 x 3P 2.00 mm 180D(M) DIP 1140-010-06SN
Setting	Function
(1-3)	COM5 RS485 impedance off
(3-5)	COM5 RS485 impedance on
(2-4)	COM6 RS485 impedance off
(4-6)	COM6 RS485 impedance on
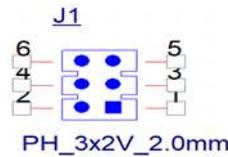
2.3.3.4 SW1

SW1 is designed for AT mode or ATX mode selection.

SW1	AT and ATX mode switch
Part Number	1600000071
Footprint	SW_3P_CJS-1201TA1
Description	Slide SW CJS-1201TA1 SMD 3P SPDT P = 6.0 mm W = 2.5 mm
Setting	Function
(1-2)	ATX
(2-3)	AT
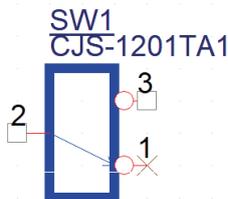
2.3.3.5 VDD3

VDD3 is designed for LVDS VDD 3.3V and 5V level selection.

| VDD3	LVDS VDD 3.3/5V level select
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	Pin header 3 x 1P 2.0 mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	3.3V
(2-3)	5V
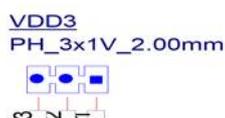
2.3.3.6 BLP1

RSB-4710 LVDS backlight supports 3.3.V/5V/12V power supply via BLP1/BLP2 selection.

BLP1	LVDS BKLT PWR 3.3/5V level select
Part number	1653003100
Footprint	PH3x1P-2.54
Description	Pin header 3 x 1P 2.54 mm 180D(M) DIP 1130-000-03S
Setting	Function
(1-2)	5V
(2-3)	3.3V
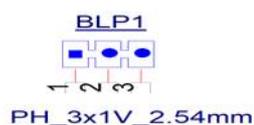
2.3.3.7 BLP2

RSB-4710 LVDS backlight supports 3.3.V/5V/12V power supply via BLP1/BLP2 selection.

| BLP2	LVDS BKLT PWR 12V level select
Part Number	1653002100
Footprint	PH2x1P-2.54
Description	Pin header 2 x 1P 2.54 mm 180D(M) DIP 21N12564-
Setting	Function
(1-2)	12V
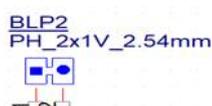
2.3.3.8 VDD1

VDD1 is designed for EDP VDD 3.3/5V level selection.

VDD1	EDP VDD 3.3/5V level select
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	Pin header 3 x 1P 2.0 mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	3.3V
(2-3)	5V

This pin header is designed for EDP panel VDD level selection.

VDD1

PH_3x1V_2.00mm
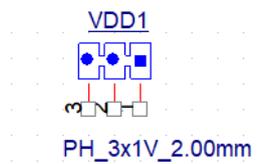
2.4 Connectors

2.4.1 Connector List

AUDIO	Audio pin header
EDP	EDP CONN
LVDS	LVDS CONN
BL	LVDS BKL CONN
CSI	CSI CONN
MINIPCIE	MINI PCIe 52P
SIM	Nano SIM card
M2	M.2 CONN
SD	SD slot
BTN	Power button and LED
DCIN1	12V DC jack
COM1	COM1
COM2/Debug	COM2
HDMI1	HDMI1 CONN
HDMI2	HDMI2 CONN
USB1	USB Type A (USB 3.0 and 2.0)
USB2	USB pin header
USB3	USB pin header
LAN1	LAN1
LAN2	LAN2
BAT	RTC CONN
COM56	COM5 and COM6 with RS-232 or RS-485
COM34	COM3 and COM4 with RS-232
OTG	USB
RST	Reset button
CN3	GPIO CONN
CN1	SPI
CN2	I2C

2.4.2 Connector Settings

2.4.2.1 Audio (AUDIO)

RSB-4710 supports Line-Out, Line-In, Mic-In, and Speaker-Out. Earphones should not be connected to the Line-Out pin header. If earphone functionality is required, an amplifier must be added, and the microphone connected to the Mic-In pin header. RSB-4710 also supports a mono speaker (2.8W 4Ω or 1.5W 8Ω). Use a cable (Advantech part number: 1700031093-01) for Line-Out and Mic-In tests.

The audio connector pins are defined below.

| Pin	Pin Name	Pin	Pin Name
1	LOUTRC_M	2	LOUTLC_M
3	NC	4	NC
5	GND_A	6	GND_A
7	MIC_IN1_P	8	MIC_IN1_N
9	LINE_IN_R	10	LINE_IN_L
11	SPO_P	12	SPO_N
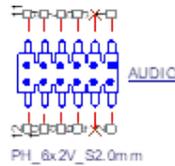
Figure 2.1 Audio Connector

2.4.2.2 EDP Connector (EDP)

RSB-4710 supports one 40- pin EDP connector. The pin definitions are provided below.

| Pin	Signal Name	Pin	Signal Name
1	NC	2	GND
3	EDP_z_TXN3	4	EDP_z_TXP3
5	GND	6	EDP_z_TXN2
7	EDP_z_TXP2	8	GND
9	EDP_z_TXN1	10	EDP_z_TXP1
11	GND	12	EDP_z_TXN0
13	EDP_z_TXP0	14	GND
15	EDP_z_AUX+	16	EDP_z_AUX-
17	GND	18	VDD_EDP
19	VDD_EDP	20	VDD_EDP
21	VDD_EDP	22	NC
23	GND	24	GND
25	GND	26	GND
27	EDP_HPD	28	GND
29	GND	30	GND
31	GND	32	BL_ENABLE
33	BL_PWM_DIM	34	NC
35	NC	36	BL_PWR
37	BL_PWR	38	BL_PWR
39	BL_PWR	40	NC
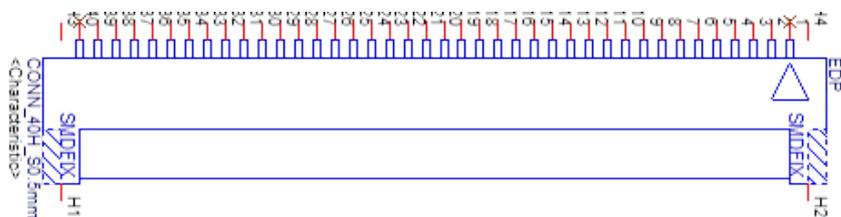
Figure 2.2 EDP Connector

2.4.2.3 LVDS Connector (LVDS)

RSB-4710 provides an LVDS 20 x 2-pin board-to-board connector for one port of single or dual-channel 18/24-bit LVDS. To avoid damaging the LCD panel, ensure that the voltage is correct before connecting an LVDS panel (refer to Section 2.3.3.5 for the VDD3 jumper settings and the LCD datasheet).

| Pin	Pin Name	Pin	Pin Name
1	VDD_LVDS	2	VDD_LVDS
3	GND	4	GND
5	VDD_LVDS	6	VDD_LVDS
7	LVDS1_Z_D0N	8	LVDS2_Z_D0N
9	LVDS1_Z_D0P	10	LVDS2_Z_D0P
11	GND	12	GND
13	LVDS1_Z_D1N	14	LVDS2_Z_D1N
15	LVDS1_Z_D1P	16	LVDS2_Z_D1P
17	GND	18	GND
19	LVDS1_Z_D2N	20	LVDS2_Z_D2N
21	LVDS1_Z_D2P	22	LVDS2_Z_D2P
23	GND	24	GND
25	LVDS1_Z_CLK0N	26	LVDS2_Z_CLK0N
27	LVDS1_Z_CLK0P	28	LVDS2_Z_CLK0P
29	GND	30	GND
31	NC	32	NC
33	GND	34	GND
35	LVDS1_Z_D3N	36	LVDS2_Z_D3N
37	LVDS1_Z_D3P	38	LVDS2_Z_D3P
39	GND	40	VDD_LVDS
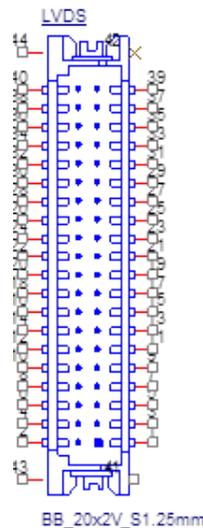
Figure 2.3 LVDS Connector

2.4.2.4 LVDS Inverter Power Connector (BL)

To avoid damaging the LCD panel, ensure that the voltage is correct before connecting an LVDS panel (refer to Section 2.3.3.6 for the BLP1 jumper settings and the LCD datasheet).

| Pin	Description
1	+VDD_BKLT
2	GND
3	LVDS_BLEN
4	LVDS_PWM
5	+5V
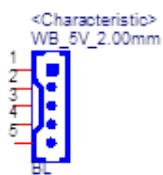
Figure 2.4 LVDS Backlight Connector

2.4.2.5 MIPI CSI Connector (CSI)

RSB-4710 supports the MIPI CSI interface. The pin definitions are provided below.

| Pin	Signal Name	Pin	Signal Name
1	+V3_CAMAF_B	2	+V3_CAMAF_B
3	MIPI_RX0_D0P	4	MIPI_RX0_D0N
5	GND	6	MIPI_RX0_D1P
7	MIPI_RX0_D1N	8	GND
9	MIPI_RX0_D2P	10	MIPI_RX0_D2N
11	CAM1_RST#_C	12	MIPI_RX0_D3P
13	MIPI_RX0_D3N	14	GND
15	MIPI_RX0_CLKP	16	MIPI_RX0_CLKN
17	GND	18	I2C_CSI1_CK
19	I2C_CSI1_DAT	20	CAM1_PWR#_C
21	CAM0_X_MCK	22	CAM1_PWR#_C
23	NC	24	NC
25	GND	26	NC
27	NC	28	GND
29	NC	30	NC
31	NC	32	NC
33	NC	34	GND
35	NC	36	NC
37	NC	38	NC
39	NC		
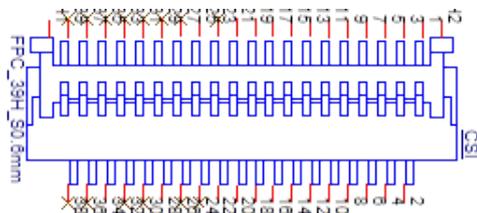
Figure 2.5 MIPI CSI Connector

2.4.2.6 Mini PCIe (MINIPCIE)

RSB-4710 supports the mini PCIe interface. The pin definitions are provided below.

| Pin	Signal Name	Pin	Signal Name
1	NC	2	+3.3V_PCIe
3	NC	4	GND
5	NC	6	NC
7	NC	8	UIM_PWR
9	GND	10	UIM_DATA
11	NC	12	UIM_CLK
13	NC	14	UIM_RST
15	GND	16	NC
17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	PERST_M#
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	USB_MINIPCIE_N
37	GND	38	USB_MINIPCIE_P
39	+3.3V_PCIe	40	GND
41	+3.3V_PCIe	42	LED_WWAN#
43	GND	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	+3.3V_PCIe
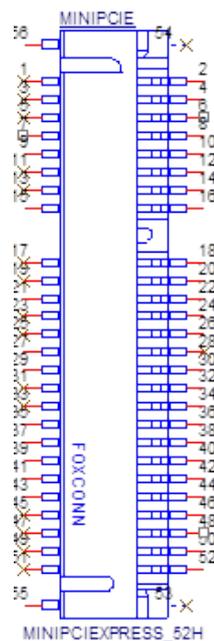
Figure 2.6 Mini PCIe Connector

2.4.2.7 Nano SIM Card (SIM)

RSB-4710 features one onboard nano SIM card slot for 4G integration. Insert a valid mini PCIe card and SIM card to connect to a 4G network.

| Pin	Description
C1	SIM_VCC
C2	SIM_RST
C3	SIM_CLK
C5	GND
C6	NC
C7	SIM_DATA
CD	GND
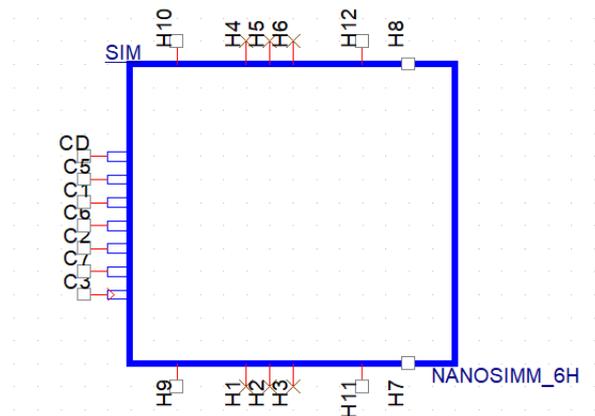
Figure 2.7 Nano SIM Card

2.4.2.8 M.2 (M2)

RSB-4710 supports a socket1 connectivity type 2230 S1, S2, S3 E-key M.2 interface. The pin definitions are provided below.

Pin	Signal Name	Pin	Signal Name
1	GND	2	+V3.3A_M.2
3	USB_M.2+	4	+V3.3A_M.2
5	USB_M.2-	6	NC
7	GND	8	NC
9	SDIO0_z_CLK	10	NC
11	SDIO0_z_CMD	12	NC
13	SDIO0_z_D0	14	NC
15	SDIO0_z_D1	16	NC
17	SDIO0_z_D2	18	GND
19	SDIO0_z_D3	20	BT_z_WAKE_L
21	WIFI_z_WAKE_L	22	UART0_z_RXD
23	NGFF_WIFI_REG_ON		
Mechanical Key	Mechanical key	Mechanical key	Mechanical key
		32	UART0_z_TXD
33	GND	34	UART0_z_CTS
35	NGFF_PCIE_TX+	36	UART0_z_RTS
37	NGFF_PCIE_TX-	38	NC
39	GND	40	NC
41	NGFF_PCIE_RX+	42	NC
43	NGFF_PCIE_RX-	44	NC
45	GND	46	NC
47	CK_z_NGFF+	48	NC
49	CK_z_NGFF-	50	CLKO_z_WIFI
51	GND	52	PERST#
53	PCIE_z_REQ#	54	NGFF_BT_DISABLE#
55	NC	56	NGFF_WIFI_DISABLE#
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	+V3.3A_M.2
73	NC	74	+V3.3A_M.2
75	GND		
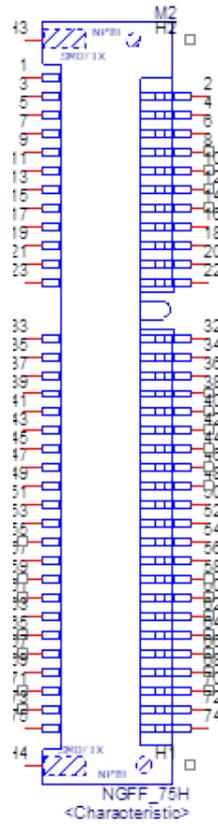
Figure 2.8 M.2 Connector

2.4.2.9 Micro SD (SD)

RSB-4710 supports an SD/MMC card in Class 2, 4, 6, 8, and 10 and up to 64GB.

Pin	Signal Name
1	SDMMC0_z_D2
2	SDMMC0_z_D3
3	SDMMC0_z_CMD
4	+V3V_SD
5	SDMMC0_z_CLK
6	GND
7	SDMMC0_z_D0
8	SDMMC0_z_D1
CD	SD_CD

Figure 2.9 Micro SD

2.4.2.10 Power Button and LED (BTN)

RSB-4710 supports a power button, power LED light, and 4G LED light via two 3-pin headers. A cable (Advantech part number: 1700031120-01) can be used to connect the power button.

Pin	Pin Name
1	PWR_BTN (PWR_BTN+)
2	GND (PWR_BTN-)
3	PWR_LED (PWR_LED+)
4	GND (PWR_LED-)
5	+3.3V_PCIe (4G_LED+)
6	4GLED_WWAN#(4G_LED-)
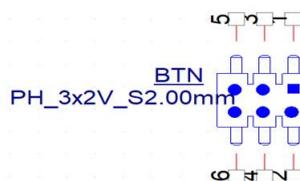
Figure 2.10 Power Button and LED Connector

2.4.2.11 DC Power Jack (DCIN1)

RSB-4710 supports a DC jack header that can be connected to a 12V$_{DC}$ external power input.

| Pin	Description
1	V_DC_IN (12V)
2	GND
3	GND
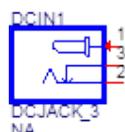
Figure 2.11 DC Power Jack

2.4.2.12 RS-232 (COM1)

RSB-4710 provides one D-Sub 9-pin connector serial communication interface port. The port can support RS-232 communication.

| Pin	Description
1	NC
2	COM4_RXD
3	COM4_TXD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC
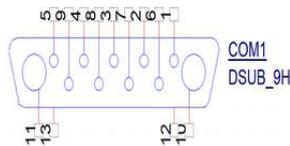
Figure 2.12 COM1 Connector

2.4.2.13 RS-232/Debug Port (COM2/DEBUG)

RSB-4710 can communicate with a host server (Windows or Linux) via a debug cable (Advantech part number: 1700028481-01).

| Pin	Description
1	NC
2	COM2_TXD
3	COM2_RXD
4	GND
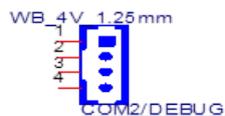
Figure 2.13 COM2/Debug Connector

2.4.2.14 HDMI Connector (HDMI1, HDMI2)

RSB-4710 features two HDMI ports. The pin definitions are provided below.

Pin	Description	Pin	Description
1	HDMI1_z_DATA2+	11	GND
2	GND	12	HDMI1_z_CLK-
3	HDMI1_z_DATA2-	13	HDMI1_z_CEC
4	HDMI1_z_DATA1+	14	NC
5	GND	15	HDMI1_DDC_CLK
6	HDMI1_z_DATA1-	16	HDMI1_DDC_DATA
7	HDMI1_z_DATA0+	17	GND
8	GND	18	+5V_HDMI
9	HDMI1_z_DATA0-	19	HDMI1_HPD
10	HDMI1_z_CLK+		
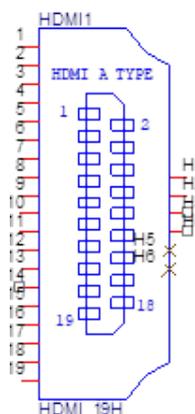
Figure 2.14 HDMI1 Connector

| Pin	Description	Pin	Description
1	HDMI2_z_2+	11	GND
2	GND	12	HDMI2_z_CLK-
3	HDMI2_z_2-	13	NC
4	HDMI2_z_1+	14	NC
5	GND	15	HDMI2_SCL
6	HDMI2_z_1-	16	HDMI2_SDA
7	HDMI2_z_0+	17	GND
8	GND	18	+5V_HDMI
9	HDMI2_z_0-	19	HDMI2_HPD
10	HDMI2_z_CLK+		
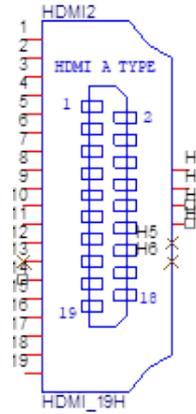
Figure 2.15 HDMI2 Connector

2.4.2.15 USB Type A Connector (USB1)

RSB-4710 supports one standard USB 3.0 and one USB 2.0 Type A connector on the coastline.

Pin	Description
1	+USBV1
2	USB_D1-
3	USB_D1+
4	GND
5	USB3X0_z_RX-
6	USB3X0_z_RX+
7	GND
8	USB3X0_z_TX-
9	USB3X0_z_TX+
10	+VUSB3
11	USB_D2-
12	USB_D2+
13	GND
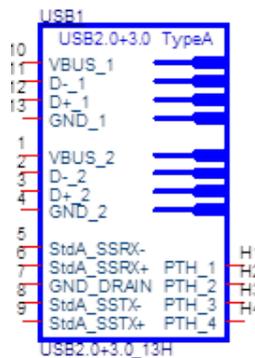
Figure 2.16 USB Connector

2.4.2.16 USB (Internal Pin Header) (USB2, USB3)

RSB-4710 provides three extra internal USB 2.0 ports via pin header USB2 and USB3. The USB2 pin definitions are provided below.

Pin	Description	Pin	Description
1	+VUSB3	2	+VUSB3
3	USB_z_P2_DM	4	USB_z_P1_DM
5	USB_z_P2_DP	6	USB_z_P1_DP
7	GND	8	GND
9	GND	10	NC
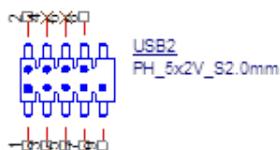
Figure 2.17 USB2 Pin Header

The USB3 pin definitions are provided below.

| Pin	Description	Pin	Description
1	+VUSB3	2	+VUSB3
3	USB_z_P6_DM	4	NC
5	USB_z_P6_DP	6	NC
7	GND	8	GND
9	GND	10	NC
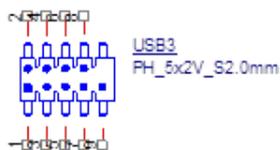
Figure 2.18 USB3 Pin Header

2.4.2.17 Ethernet Connector (LAN1)

RSB-4710 provides one RJ45 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 feature a standard RJ-45 jack connector with LED indicators at the front to indicate the Active/Link and Speed status. POE function can be expanded via this LAN port.

| Pin	Description
L1	LAN1_LDO1_LED2
L2	LAN1_LDO0_LED1
R11	LAN1_MDI0+
R12	LAN1_TCT1
R10	LAN1_MDI0-
R4	LAN1_MDI1+
R6	LAN1_TCT2
R5	LAN1_MDI1-
R3	LAN1_MDI2+
R1	LAN1_TCT3
R2	LAN1_MDI2-
R8	LAN1_MDI3+
R7	LAN1_TCT4
R9	LAN1_MDI3-
R13	VA1
R14	VA2
R15	VB1
R16	VB2
L3	LAN1_z_LED0_ACT#
L4	+V3.3
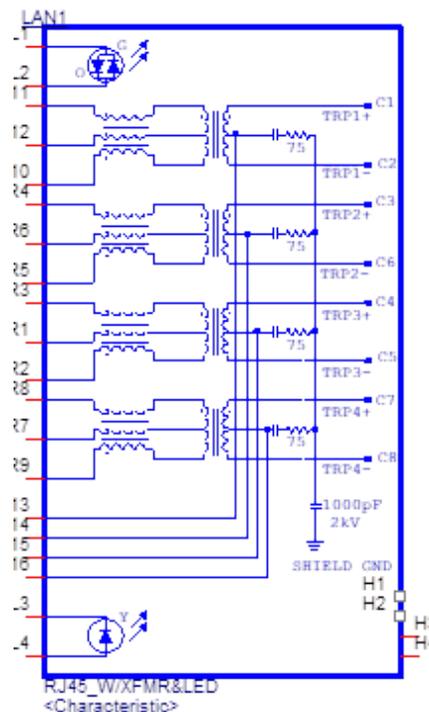
Figure 2.19 LAN1 Ethernet Connector

2.4.2.18 Ethernet Connector (LAN2)

RSB-4710 provides one RJ45 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 feature a standard RJ-45 jack connector with LED indicators at the front to indicate the Active/Link and Speed status.

| Pin	Description
1	LAN2_MDI0+
2	LAN2_MDI0-
3	LAN2_MDI1+
4	LAN2_MDI1-
5	LAN2CONN
6	LAN2_GND
7	LAN2_MDI2+
8	LAN2_MDI2-
9	LAN2_MDI3+
10	LAN2_MDI3-
11	LAN2_LINK_ACT#
12	+V3.3A_LAN2
13	LAN2_LINK1000#
14	LAN2_LINK100#
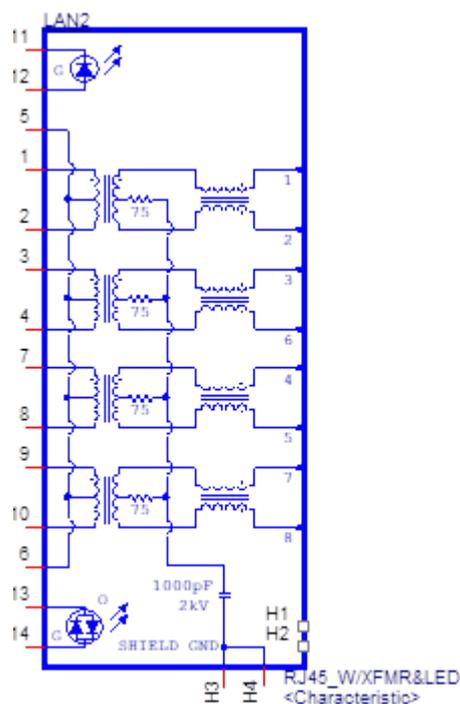
Figure 2.20 LAN2 Ethernet Connector

2.4.2.19 RTC Battery Connector (BAT)

RSB-4710 supports a lithium 3V, 210mAH CR2032 battery with wafer box.

| Pin	Description
1	COIN_RTC
2	GND
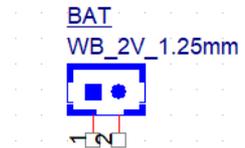
Figure 2.21 RTC Battery Connector

2.4.2.20 RS-232/485 (COM56)

RSB-4710 provides a two-port RS-232/458 pin header. Users can configure RS-232/485 mode on uboot. The system must be reset after switching to RS-485 from RS-232. A cable (Advantech part number: 1700031060-01) can be used for connecting a standard D-SUB 9P connector.

| Pin	Description
1	COM8_TXD_c
2	COM8_RXD_c (RS-485 data +)
3	COM8_RTS_c
4	COM8_CTS_c
5	COM8_DCD_c (RS-485 data -)
6	GND
7	GND
8	COM9_DCD_c (RS-485 data -)
9	COM9_CTS_c
10	COM9_RTS_c
11	COM9_RXD_c (RS-485 data +)
12	COM9_TXD_c
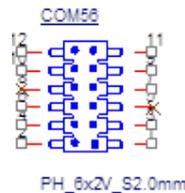
Figure 2.22 Internal RS-232 Pin Header

2.4.2.21 Internal RS-232 (COM34)

RSB-4710 provides a two-port RS-232 pin header that can supply 5V or 12V power via J3 selection.

| Pin	Description
1	COM6_TXD
2	COM6_RXD
3	COM6_RTS#
4	COM6_CTS#
5	COM6_PWR
6	GND
7	GND
8	COM7_PWR
9	COM7_CTS#
10	COM7_RTS#
11	COM7_RXD
12	COM7_TXD
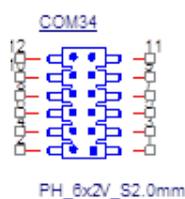
Figure 2.23 Internal RS-232/485 Pin Header

2.4.2.22 Micro USB Connector (OTG)

RSB-4710 supports one USB OTG port on the coastline.

Pin	Description
1	+USB_OTG_5V
2	USB_OTG-_X
3	USB_OTG+_X
4	USB_OTG_ID_X
5	GND
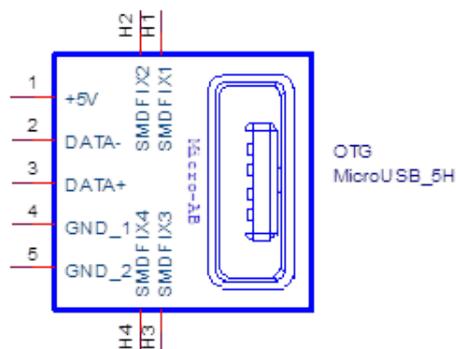
**Figure 2.24 Micro USB Connector**

2.4.2.23 Reset button (RST)

RSB-4710 supports a reset button on the coastline.

| Pin	Description
1	+V3.3A
2	+VPP_OTP
3	GND_F
4	GND_F
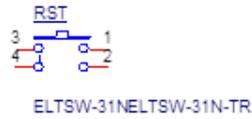
Figure 2.25 Reset Button

2.4.2.24 GPIO (CN3)

RSB-4710 provides one internal GPIO interface via a 10-pin wafer box.

Pin	Pin Name	Pin	Pin Name
1	GND	2	NC
3	NC	4	NC
5	GPIO2	6	GPIO6
7	GPIO1	8	GPIO5
9	+3.3V	10	GPIO4
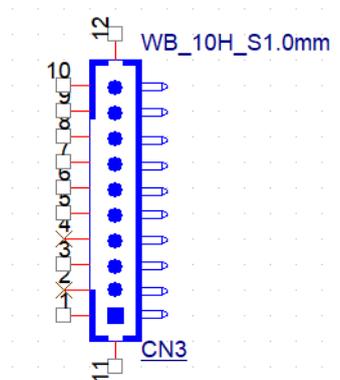
Figure 2.26 GPIO Pin Header

2.4.2.25 SPI (CN1)

RSB-4710 provides one SPI via a 6-pin wafer box.

Pin	Description
1	+VCC_3V0
2	SPI2_CSN0
3	SPI2_CLK
4	SPI2_TXD
5	SPI2_RXD
6	GND
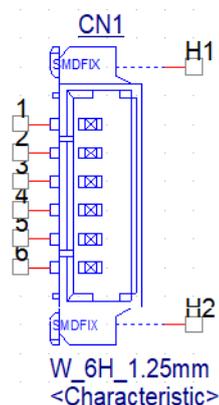
Figure 2.27 SPI Pin Header

2.4.2.26 I2C (CN2)

RSB-4710 provides one I2C via a 5-pin wafer box.

Pin	Description
1	+3.3V
2	I2C4_SCL_CONN
3	I2C4_SDA_CONN
4	Touch_INT#
5	GND

Figure 2.28 I2C Connector
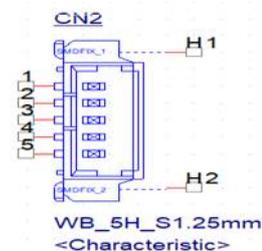
2.5　LED

| Name	Description
LED6	Power LED
LED3	WWAN LED

2.6　Quick Start Guide

2.6.1　Debug Port Connection

1. Connect the debug cable to the RSB-4710 debug port (see Figure 2.3).

Item	Part Number	Picture
Debug cable	1700021565-11	
Debug cable	1700026611-01	

2. Connect the other end of the debug cable to the PC directly or via a USB-to-RS-232 cable.
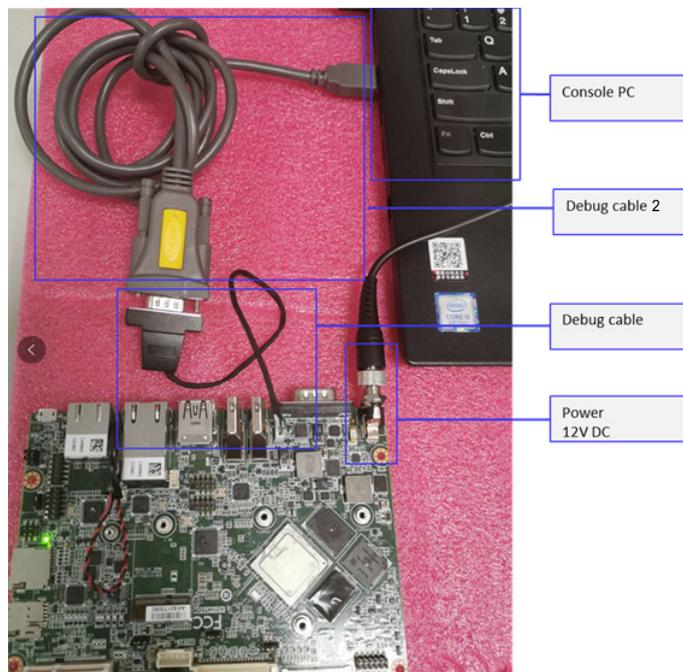
2.6.2 Debug Port Setting

RSB-4710 can communicate with a host server via serial cables. Common serial communication programs such as HyperTerminal, Tera Term, or PuTTY can be used. The following example explains serial terminal setup using HyperTerminal on a Windows host:

1. Open HyperTerminal on the Windows PC and configure the settings as shown below.

2. Insert a power adapter connector into the DC jack on RSB-4710 to supply power to the board. The bootloader prompt will be displayed on the terminal screen.

RSB-4710 User Manual
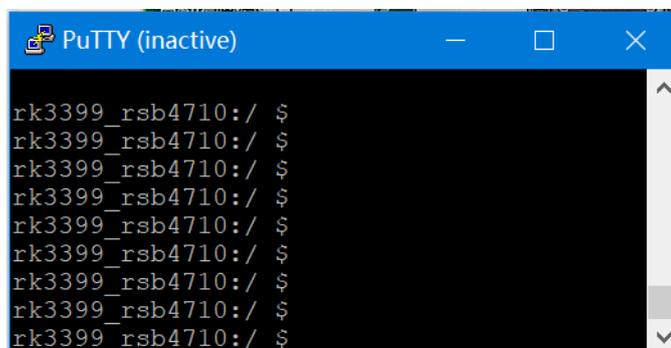
Chapter 3

Software Functionality

This chapter details software functions on RSB-4710.

3.1 Introduction

This chapter explains how to develop software for RSB-4710 to enable users to develop unique applications efficiently.

RSB-4710 is designed be developed in a Linux host environment. For now, the officially supported host OS is Ubuntu 16.04 LTS (64 bit). Compatibility problems may occur when using a Windows or Android environment for application development. Therefore, we strongly recommend installing Ubuntu 16.04 LTS (64 bit) on your host PC before attempting to develop RSB-4710.

However, RSB-4710 itself supports the Android 7.1 and Linux Debian OS.

3.2 Build Environment

All instructions in this chapter are based on the Ubuntu 16.04 LTS (64 bit) OS. This OS should be installed in advance on a host PC with a minimum of 4GB DRAM memory. After logging into the host PC, follow the instructions in the sections below for RSB-4710 development.

3.2.1 Install Docker

To use Docker for development, Docker must be installed on the host PC. Refer to the Docker Installation Guide for installation instructions. Linux, Windows, and OS X all support Docker.

3.2.2 Get Base Image

To download the images in the image provided, docker pull from the <IMAGE REPOSITORY>.

```
# docker pull advrisc/u16.04-imx6abv5:20170523
```

3.2.3 Obtain Android Source Code

Related version information:
- Android 7.1.2
- Kernel 4.4.126
- U-Boot 2014-10

Pull down the Android source tree to your working directory from the repositories specified in the default manifest.

```
$ cd ~/BSP
$ sudo git clone https://github.com/rockchip-linux/repo.git
$ mkdir rk3399_android_n7
$ cd rk3399_android_n7
$ git config --global user.name "Your Name"
$ git config --global user.email you@example.com
$ ../repo/repo init -u https://gitlab.wise-paas.com/RISC/android-manifest.git -b android-7.1.2 -m default.xml
$ ../repo/repo sync
$ ../repo/repo forall -c git checkout -b local --track origin/android-7.1.2
```

Folder descriptions are provided below.

android/u-boot/
U-Boot source code

android/device/rockchip/
Android device related settings

hardware/rockchip/
HAL (Hardware Abstraction Layer)

android/kernel/
Linux kernel source code

3.2.4 Building an Android 7.1.2 image

Start Docker Container

```
# docker run -it --name android_n7 -v /home/bsp/myandroid:/home/adv/BSP:rw advrisc/
u16.04-imx6abv5:20170523 /bin/bash
```

Build Instructions
Set the $JAVA_HOME environment variable.

```
$ export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
$ export PATH=$JAVA_HOME/bin:$PATH
$ export CLASSPATH=.:$JAVA_HOME/lib:$JAVA_HOME/lib/tools.jar
```

Set up the environment for building. This only configures the current terminal.

```
$ source build/envsetup.sh
```

Execute the Android lunch command. In this example, the setup is for the production image of Advantech RISC platform device with user debug type. If your device is RSB-4710, you will be sent a "lunch rk3399_rsb4710-userdebug" command.

```
$ lunch rk3399_rsb4710-userdebug
```

To build a boot loader
Perform the following command in the terminal console.

```
$ cd u-boot
$ make rk3399_rsb4710a2_2G_defconfig
$ make ARCHV=aarch64
```

To build a kernel image
Perform the following command in the terminal console.

```
$ cd kernel
$ make ARCH=arm64 rk3399_adv_defconfig -j8
$ make ARCH=arm64 rk3399-rsb4710-a2.img -j12
```

To build a system image

Perform the following command in the terminal console.

```
$ source build/envsetup.sh
$ lunch rk3399_rsb4710-userdebug
$ make -j4 2>&1 | tee build-log.txt
$ ./mkimage.sh
```

All Android images will be generated in the rockdev/Image- rk3399_rsb4710/ folder. The common image files are listed below.

```
# boot.img         : Android's initramfs, to initialize and mount system partition.
# kernel.img       : Kernel image.
# misc.img         : Misc partition image, to switch boot mode and pass parameter in recovery mode.
# recovery.img     : Recovery mode image.
# resource.img     : Resource image, containing boot logo and kernel's device tree info.
# system.img       : System partition image with ext4 filesystem format.
# uboot.img        :uboot
#trust.img    : trust zome image
# MiniLoaderAll.bin :Loader
```

3.3 GPIO

The RK3399 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. GPIO2_B0 becomes 72

GPIO Number	GPIO formed	Numeric Representation
GPIO1	GPIO2_B0	72
GPIO2	GPIO1_C2	50
GPIO4	GPIO3_D4	124
GPIO5	GPIO4_A4	132
GPIO6	GPIO0_B0	8

Export GPIO in order to use control GPIO from the user space through sysfs.

Export GPIO1.

```
$ echo 72 > /sys/class/gpio/export
```

Set GPIO direction to in/out.

```
$ echo "out" > /sys/class/gpio/gpio72/direction
```

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

```
$ echo 1 > /sys/class/gpio/gpio72/value
```

Used as IRQ signal.
Note: You have to configure GPIO to input.

```
$ echo "rising" > /sys/class/gpio/gpio72/edge
NOTE: rising: Trigger on rising edge
    falling: Trigger on falling edge
    both: Trigger on both edges
    none: Disable interrupt on both edges
```

Unexport GPIO1.

```
$ echo 72 > /sys/class/gpio/unexport
```

GPIO 1 and GPIO 2 are taken as an example:
Connect GPIO 1 and GPIO 2.
Export GPIO 1 and GPIO 2.

```
$ echo 72 > /sys/class/gpio/export
$ echo 50 > /sys/class/gpio/export
```

Set GPIO 1 to output.

```
$ echo "out" > /sys/class/gpio/gpio72/direction
```

Set GPIO 2 to input.

```
$ echo "in" > /sys/class/gpio/gpio50/direction
```

Change GPIO 1 to 1 and read GPIO 2 value.

```
$ echo 1 > /sys/class/gpio/gpio72/value
$ cat /sys/class/gpio/gpio50/value
1
```

Change GPIO 1 to 0 and read GPIO 2 value.

```
echo 0 > /sys/class/gpio/gpio72/value
$ cat /sys/class/gpio/gpio50/value
0
```

3.4 UART

The Android/Linux UART/serial port access is via 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 transmit mode. Usually the UART RTS signal is used to switch the transmitter on and off.

3.4.1 RSB-4710 UART

COM Name	Device Node	Remark
COM1	/dev/ttyS4	Supports RS-232, no flow control
COM2	/dev/ttyS2	Debug port
COM3	/dev/ttyUSB0	Supports RS-232
COM4	/dev/ttyUSB1	Supports RS-232
COM5	/dev/ttyUSB2	Supports RS-232 and RS-485
COM6	/dev/ttyUSB3	Supports RS-232 and RS-485

3.4.2 How to Configure RS-232/485 Mode

Enter U-boot interrupt mode.

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

Press "ctrl + c" before powering on the device. The following information should be displayed on the debug console:

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

Then input the following command to configure the UART mode.

RS-485 Mode:

```
setenv uart_mode 0x0c
saveenv
reset
```

RS-232 Mode:

```
setenv uart_mode 0x00
saveenv
reset
```

Note:

The default value is RS-232.

Cp210x supports four ports, but for RSB-4710 only ttyUSB2 and ttyUSB3 support RS-485 mode.

In the above command "setenv uart_mode 0x0c", 0x0c means set bit2(ttyUSB2) and bit3(ttyUSB3) to 1 (0 means to RS-232; 1 means to RS-485).

To configure just ttyUSB2 (or ttyUSB3) to RS-485 mode, change 0x0c to 0x04 (or 0x08).
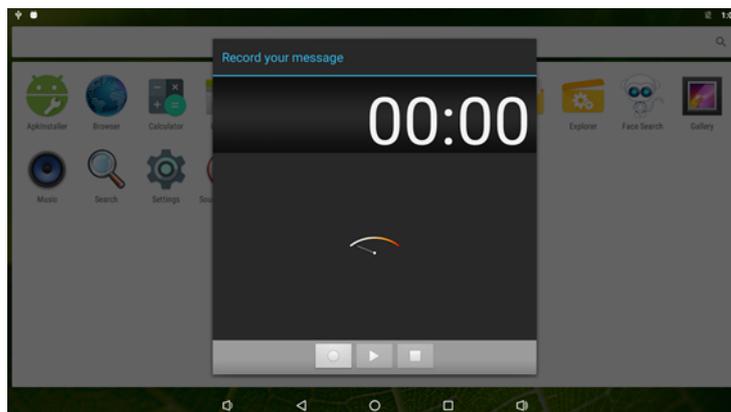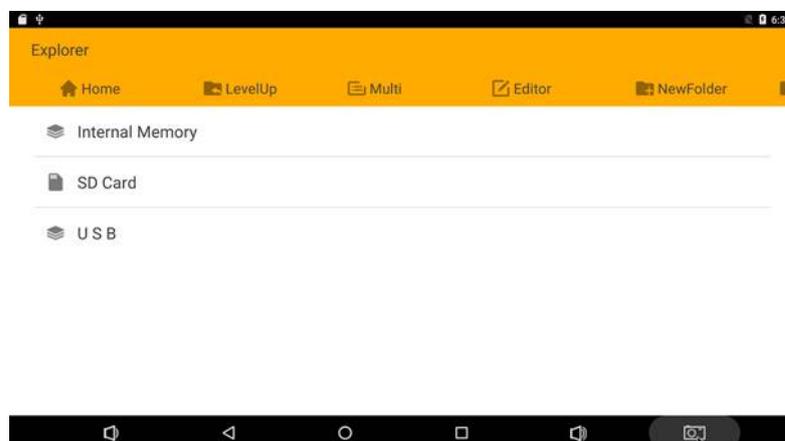
3.7 HDMI

3.7.1 HDMI Resolution

Open Settings->Display->HDMI->HDMI Resolution
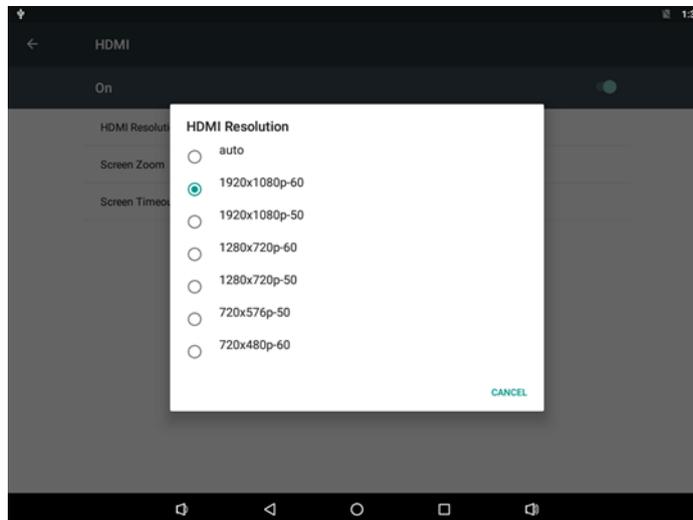
3.7.2 HDMI Audio

If the HDMI monitor supports audio, the default output will be both HDMI and the onboard audio codec.

3.8 Multiple Display

RSB-4710 supports four display ports: eDP, LVDS (MIPI-to-LVDS), HDMI, and DP (DP-to-HDMI). However, only two ports can be used simultaneously.

Default Display Support:

Port	RSB-4710
EDP	EDP-1920x1080 EDP-1366x768
LVDS	LVDS-g070vw01 LVDS-g150xgel05 LVDS-g215hvn01
HDMI	HDMI-default
DP	DP-default

Notes:
1. The name of the panel must begin with "edp-", "lvds-" , "hdmi-" or "dp-".
They can be found in "kernel/include/dt-bindings/display/screen-timing/{LCDNAME}.dtsi"
For example,
lvds_g070vw01: lvds-g070vw01
2. If no changes to the configuration have been made, the default setting will be in effect.
HDMI-default and DP-default are the default settings.
3. Check the configuration via the terminal or debug console.
cat /proc/cmdline
... prmry_screen=hdmi-default extend_screen=dp-default

3.8.1 Enter U-Boot Interrupt Mode

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

Press "ctrl + c" before powering on the device. The following information will be displayed on the debug console:

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

Then input the commands below to configure multi-display function.

3.8.2 eDP and HDMI

1. When eDP is the primary display, configure in u-boot as follows:

```
setenv prmry_screen edp-1920x1080
setenv extend_screen hdmi-default
saveenv
reset
```

2. When HDMI is the primary display, configure in u-boot as follows:

```
setenv prmry_screen hdmi-default
setenv extend_screen edp-1920x1080
saveenv
reset
```

3.8.3 HDMI and LVDS

1. When HDMI is the primary display, configure in u-boot as follows:

```
setenv prmry_screen hdmi-default
setenv extend_screen lvds-g070vw01
saveenv
reset
```

2. When LVDS is the primary display, configure in u-boot as follows:

```
setenv prmry_screen lvds-g070vw01
setenv extend_screen hdmi-default
saveenv
reset
```

3.8.4 LVDS and eDP

1. When LVDS is the primary display, configure in u-boot as follows:

```
setenv prmry_screen lvds-g070vw01
setenv extend_screen edp-1920x1080
saveenv
reset
```

2. When eDP is the primary display, configure in u-boot as follows:

```
setenv prmry_screen edp-1920x1080
setenv extend_screen lvds-g070vw01
saveenv
reset
```

3.8.5 HDMI and DP (HDMI2)

1. When HDMI is the primary display, configure in u-boot as follows:

```
setenv prmry_screen hdmi-default
setenv extend_screen dp-default
saveenv
reset
```

2. When DP(HDMI2) is the primary display, configure in u-boot as follows:

```
setenv prmry_screen dp-fefault
setenv extend_screen hdmi-default
saveenv
reset
```

3.8.6 eDP and DP (HDMI2)

1. When eDP is the primary display, configure in u-boot as follows:

```
setenv prmry_screen edp-1920x1080
setenv extend_screen dp-default
saveenv
reset
```

2. When DP(HDMI2) is the primary display, configure in u-boot as follows:

```
setenv prmry_screen dp-default
setenv extend_screen edp-1920x1080
saveenv
reset
```

3.8.7 LVDS and DP (HDMI2)

1. When LVDS is the primary display, configure in u-boot as follows:

```
setenv prmry_screen dp-default
setenv extend_screen lvds-g070vw01
saveenv
reset
```

2. When DP(HDMI2) is the primary display, configure in u-boot as follows:

```
setenv prmry_screen dp-default
setenv extend_screen edp-1920x1080
saveenv
reset
```

3.9 Network Setup

3.9.1 Wi-Fi

1. Click Settings.
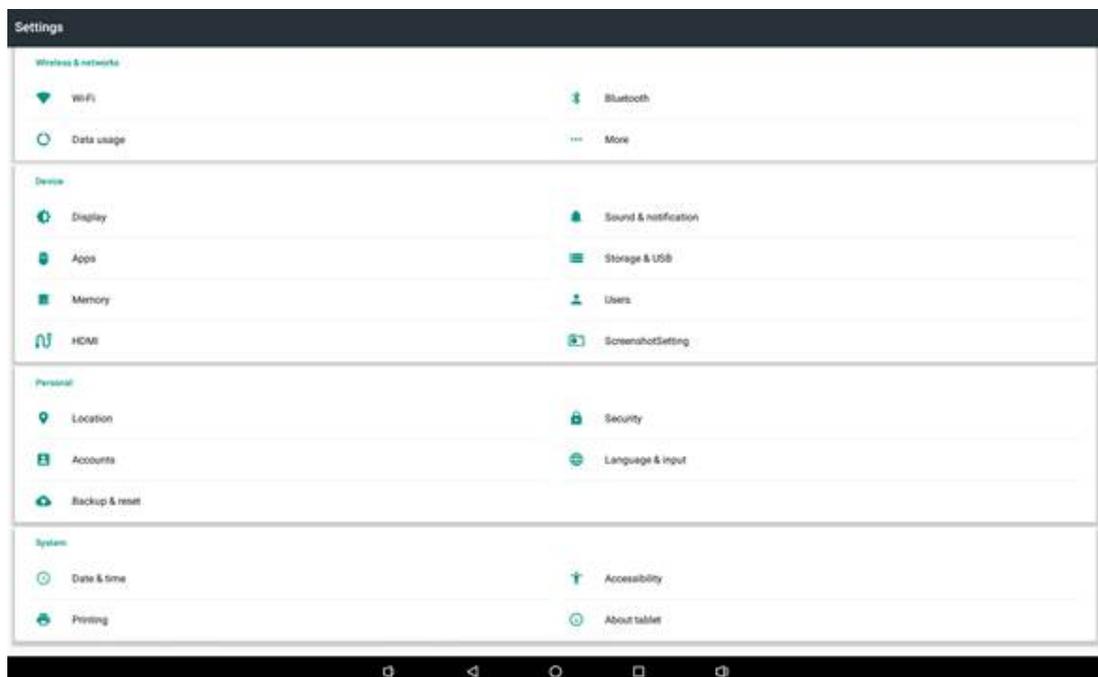
2. Turn on Wi-Fi.

3. Choose ESSID (for example, Advantech for guest).

4. Input the password.
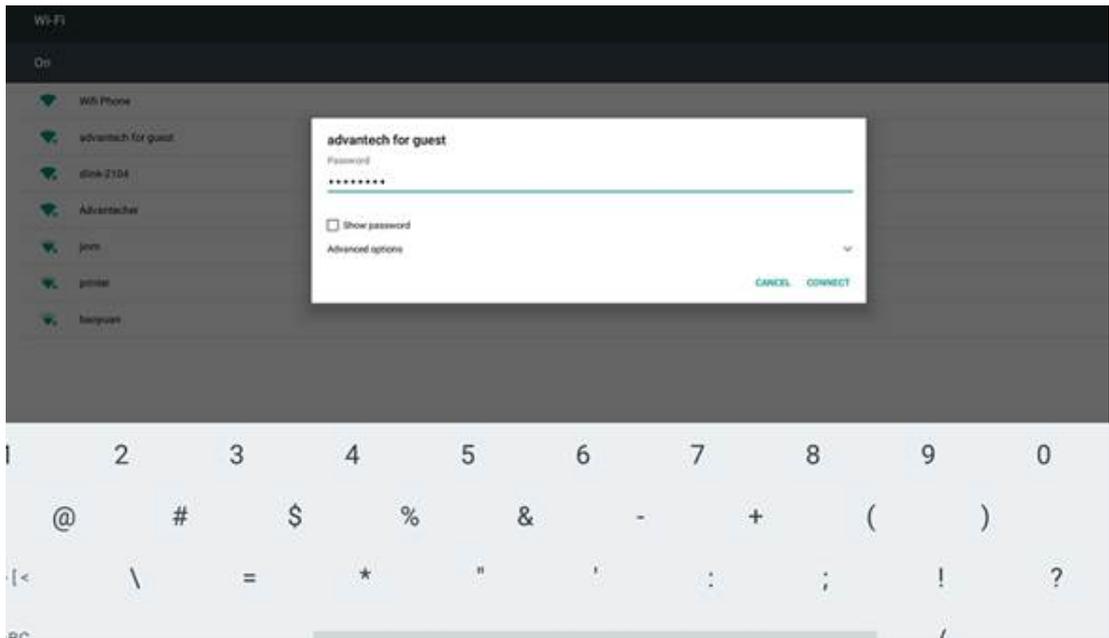
5. Wi-Fi connected.

3.9.2 Bluetooth

1. Click Settings, switch Bluetooth to on to activate Bluetooth.

2. Click any available devices to pair with.
3. After pairing successfully you can now communicate.

3.9.3 3G/4G

1. Insert SIM card. Restart the device.
2. If the device does not automatically connect to a network, navigate to the following location: Settings/More/Cellular Networks/ Access Point Names
3. Then adjust the network settings.
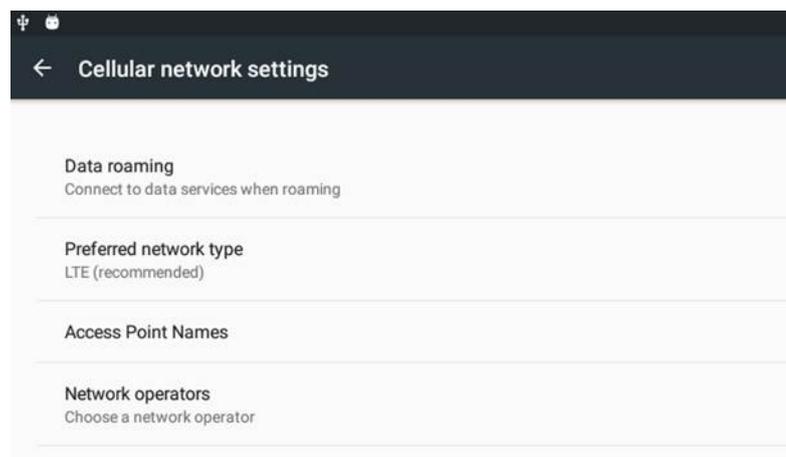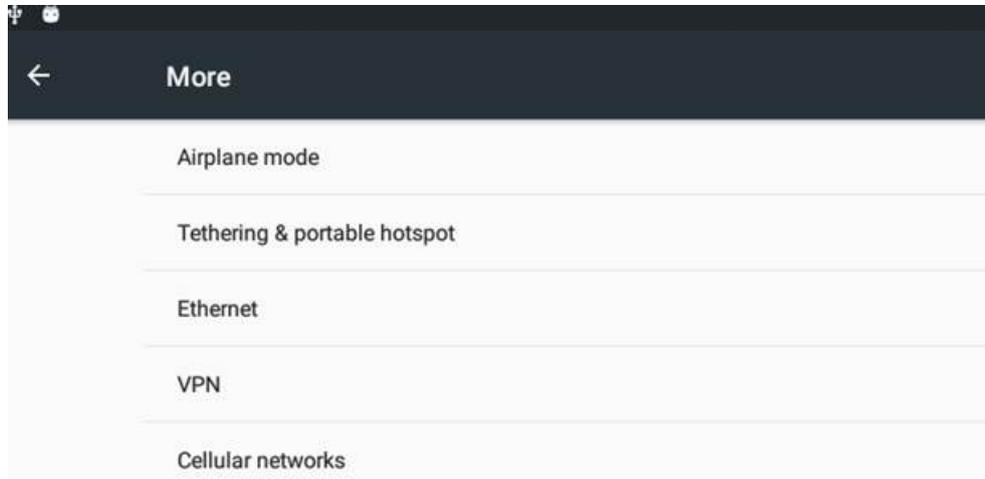
3.9.4 Ethernet

RSB-4710 supports two Ethernet ports (eth0 and eth1). However, Android only supports configuration of eth0 as follows:

Config eth0:
Click Settings->More->Ethernet Configure Ethernet.

There are two IP settings: DHCP IP and static IP

DHCP IP - configuration is controlled by the system
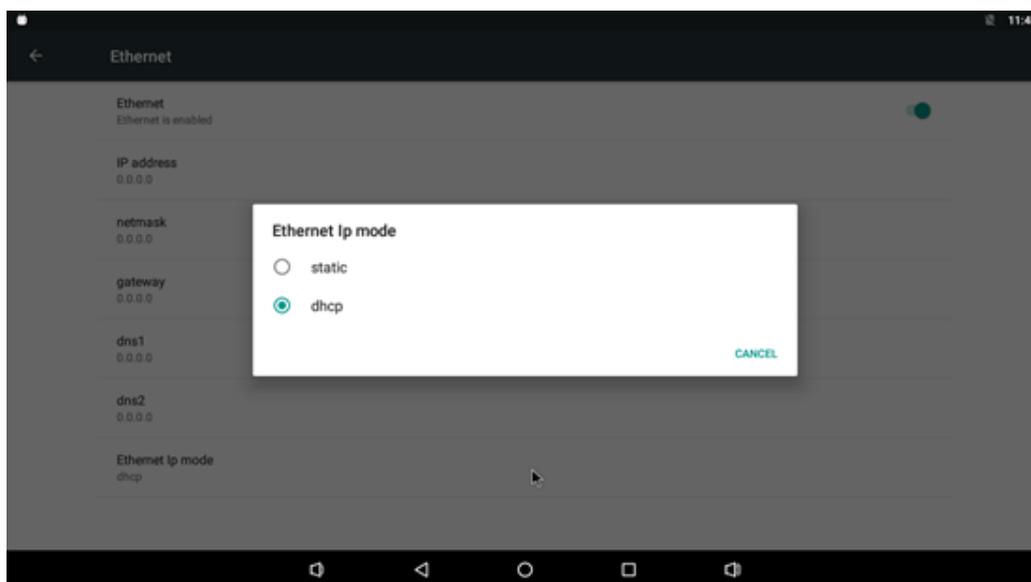
Static IP - Five fields must be filled: IP Address, Netmask, Gateway, dns1, and dns2.
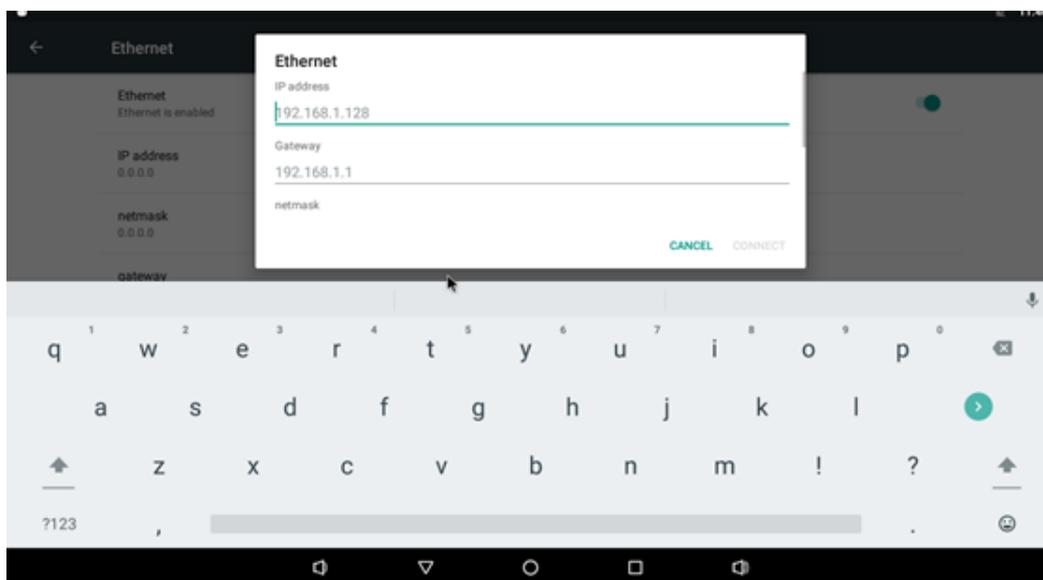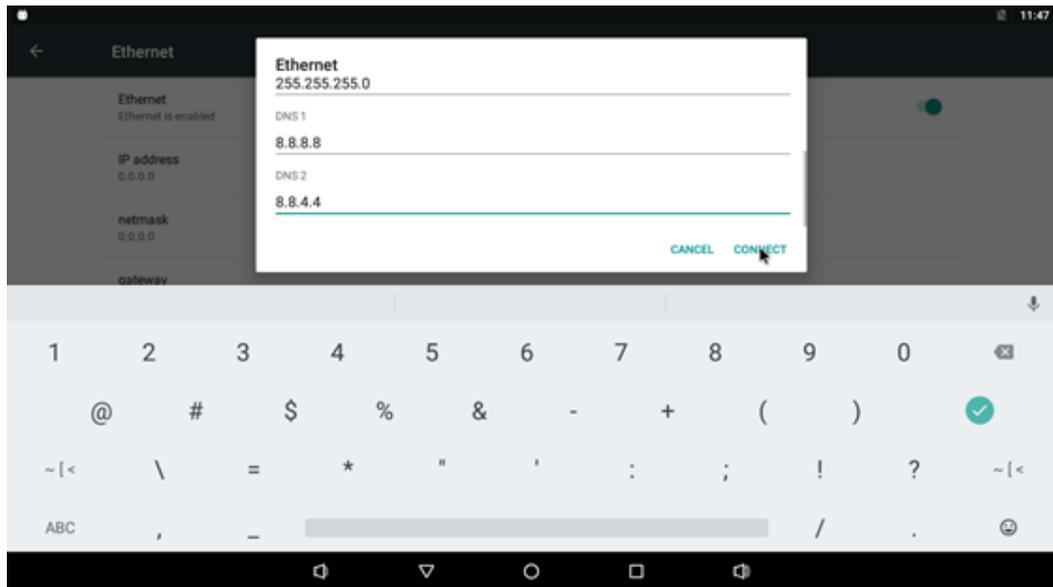
Config eth1:

Eth1 setting static ip example:

```
$ su
# ip rule add from all lookup main pref 9999
# ifconfig eth1 172.12.1.2 netmask 255.255.0.0
```

3.10 IIC

Use i2cdetect cmd to detect iic devices (for example, i2cdetect -y 4).

Chapter 4

Advantech Services

This chapter outlines Advantech's Design-In services, technical support, and warranty policy for RSB-6410.

4.1 RISC Design-In Services
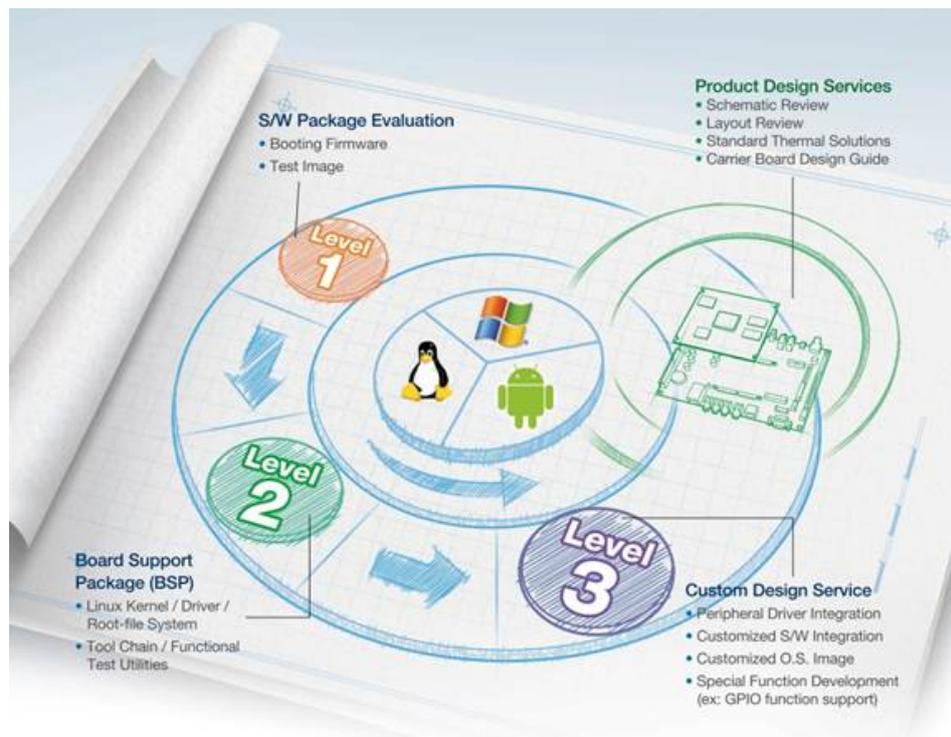
Advantech's RISC Design-In Services help customers reduce the time and work required to design new carrier boards. We handle the complexities of technical research, greatly minimizing the development risks associated with carrier boards.

Easy Development

Advantech offers support firmware, root file systems, board support packages, and other development tools that help customers easily develop unique carrier boards and differentiate their embedded products and applications.

- Full range of RISC-based product offerings
- Comprehensive document support

Design Assistance Service

Advantech provides a checklist for engineers to easily check their schematics as well as several services for reviewing customer carrier board schematics. These services aim to help identify design errors before implementation, which saves substantial development time and costs.

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

Thermal Solution Services

To provide customers with more flexible thermal solutions and designs, Advantech offers thermal solution services that include consultations and customizations.

- 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 lot of 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 in the IPC industry. In the past system integrators (SI) were used to completing projects without outside assistance but now such working models have moved on. 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 module and placing other parts on the carrier board in response to market requirements for specialization, provides greater flexibility while retaining its low power consumption credentials.

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

General I/O Design Capability

Although customers possess the ability for vertical integration and have sufficient knowledge and professional competence in the specific application field, a lack of expertise and experience in general power and I/O design can cause challenges, especially when integrating CPU modules with a carrier board.

Data Acquisition

Even if customers can obtain sufficient information to make the right decision for specialized vertical applications, some customers encounter difficulties with platform design in general and communicating with CPU or chipset manufacturers. This can increase the challenge and risks of designing carrier boards and impacting the product's time-to-market.

Software Development and Modification

Compared to x86 architectures, RISC architectures use simpler instruction sets; therefore, the software for x86 platforms cannot be used on RISC platforms. System integrators (SIs) must develop unique software for their system and integrate the hardware and software themselves. Unlike x86 platforms, RISC platforms have less support for board support packages (BSPs) and drivers. Although driver support is provided, SIs are still required to integrate them into the system core. Moreover, the BSPs provided by CPU manufacturers are typically aimed at carrier board design. Thus, they may not be an appropriate environment for software development.

To address this issue, Advantech proposed the concept of streamlined Design-In support services for RISC-based computer-on modules (COMs). With a dedicated 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 costs and hardware investment.

Because of our close relationship with leading CPU and chipset manufacturers such as ARM, TI, and Freescale, Advantech helps solve communication and technical support difficulties, which also reduces the uncertainties of product development. Advantech's software team focuses on providing comprehensive BSPs and assists customers with establishing a software development environment for RISC platforms.

Advantech's RISC Design-In services help customers overcome challenges to achieve a faster time-to-market. Along with our multi-stage development process, which includes planning, design, integration, and validation, Advantech's RISC Design-In services provide comprehensive support during the following phases:

Planning Stage

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process, including product features, specification, and compatibility testing with software. Advantech offers a RISC customer solution board (CSB) as an evaluation tool for carrier boards, which are simultaneously designed during the development of RISC COMs. During the planning stage, customers can use the CSB evaluation board to assess RISC modules and test peripheral hardware. Moreover, Advantech provides standard software BSPs for RISC COMs to allow customers to define the product specifications and verify I/O and performance. We not only offer hardware planning and technology consultations, but also software evaluations and recommendations regarding peripheral modules (such as Wi-Fi, 3G, and Bluetooth modules). Resolving customer concerns is Advantech's main target at this stage. Because product evaluation is the key task in the planning stage, especially regarding 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 carrier board design guide for reference. The carrier board design guide provides pin definitions of the COM connector with limitations and recommendations for carrier board design. This gives customers a clear guideline 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, to enable customers to examine the carrier board signals and layout design accordingly. In addition, our team is able to assist customers with reviewing the placement/layout and schematics to ensure the carrier board design meets all their requirements. For software development, Advantech's RISC software team can assist customers with establishing an environment for software development and evaluating the time and resources required. If customers outsource software development to a third party, Advantech can also cooperate with the third party and provide consultation services. With Advantech's expert support, the design process becomes much easier and the product quality is enhanced to meet all customer criteria.

Integration Stage

This phase comprises hardware and software integration, application development, and peripheral module implementation. Because they may lack the knowledge and experience of certain platforms, customers may need to spend some time analyzing integration problems. Additionally, the implementation of peripheral module depends a lot on the driver designs on carrier boards, and RISC platforms typically have less support for ready-made drivers on the carrier board. Thus, customers may have to figure out the best solution through trial and error. Advantech's team has years of

support experience and extensive hardware/software development knowledge. Consequently, we can support customers by providing expert advice and information, which will shorten the development time and enable more effective product integration.

Validation Stage

After the customer's ES sample is completed, the next step is a series of verification steps. In addition to verifying the product's functionality, the product's efficiency must also be tested at this stage, particularly with RISC platforms.

Advantech plays a supportive role in helping customers solve problems during the testing and verification process and will provide suggestions and tips as well. Through an efficient verification process backed by our technical support team, customers are able to optimize their applications with less hassle. Furthermore, Advantech's team can provide professional consultation services about further testing and equipment usage. This allows customers to find the appropriate tools to efficiently identify and solve problems and further enhance the quality and performance of their products.

4.2 Contact Information

Region/Country	Contact Information
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

Alternatively, you can contact the Advantech service team via our website.

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

Our technical support engineers will provide a quick response to your queries.

4.3 Global Service Policy

4.3.1 Warranty Policy

The warranty policy for Advantech products is provided below.

4.3.1.1 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 global warranty. Products defect in design, materials, or workmanship are covered from the date of shipment.

All customized products will have a 15-month regional warranty by default. The actual product warranty terms and conditions may vary based on the 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.

4.3.1.2 Repairs Under Warranty

It is possible to obtain a replacement product (cross-shipment) within the first 30 days after purchase. Contact your original Advantech supplier to arrange a replacement if the product was purchased directly from Advantech and was DOA (dead-on-arrival). The DOA cross-shipment excludes any shipping damage, customized and/or build-to-order products.

For products that are not DOA, the return fee to an authorized Advantech repair facility will be at the customer's expense. The shipping fee for reconstructed products from Advantech back to the customer will be at Advantech's expense.

4.3.1.3 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 the 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 failure from which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole discretion.
- The product is damaged beyond repair due to a natural disaster, such as a lighting strike, flood, earthquake, etc.
- The product is sent for updates, upgrades, or tests at the request of the customer who is without warranty.

4.3.2 Repair Process

4.3.2.1 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. To request an RMA number, visit Advantech's RMA website: http://erma.advantech.com.tw and use an authorized user ID and password.

You must fill out basic product and customer information and describe the problems encountered in detail in "Problem Description". 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. They may be able to find a solution that does not require sending the product in for repair.

The serial number of the entire product is required even if only a component is returned for repair. Otherwise, the case will be regarded as out-of-warranty.

4.3.2.2 Returning the Product for Repair

Customers may be able to save time and meet end-user requirements by returning defective products to any authorized Advantech repair facility without an extra cross-region charge. Customers are required to contact their local repair center before global repair service will be offered.

We recommend sending cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as the CPU, DRAM, and CF card. If you send all these parts back (because you believe they may be part of the problem), please clearly state that they are included. Otherwise, Advantech will not be responsible for any items not listed. Ensure that the Problem Description is enclosed.

European customers who are located outside the European community are requested to use UPS as the shipping company. We strongly recommend adding a packing list to all shipments. Please prepare a shipment invoice according to the following guidelines to minimize 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. List 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, attach an invoice with the RMA number to the carton, 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.

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 shipment methods are 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.

4.3.2.3 Service Charges

The product is excluded from warranty if

- The product is sent for repair after the warranty period is expired.
- The product is tested or calibrated after the warranty period is expired, and a NPF (no problem found) 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 environment; improperly maintained by the customer; or failure for which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole discretion.
- The product is damaged beyond repair due to a natural disaster, such as a lighting strike, flood, earthquake, etc.
- The product is sent for updates, upgrades, or tests at the request of the customer who is 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 conduct the repair free of charge. However, free repairs do not apply to products that have been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable environment; improperly maintained by the customer; or failure for which Advantech is not responsible whether by accident or other cause. Please contact your nearest regional service center for detailed service quotations.

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

4.3.2.4 Repair Report

Advantech returns each product with a repair report that shows the result of the repair. A repair analysis report can also be provided upon request. If the defect is not caused by Advantech's design or manufacturing, customers will be charged US$60 or US$120 for in-warranty or out-of-warranty repair analysis reports, respectively.

4.3.2.5 Custody of Products Submitted for Repair

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

4.3.2.6 Shipping Back to Customer

The forwarding company for RMA returns from Advantech to customers is selected by Advantech. Other express services, such as UPS or FedEx, can be used upon request. However, the customer must bear the extra costs of alternative shipment methods. If you require any special arrangements, please specify this when shipping the product to us.

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Enabling an Intelligent Planet