

RSB-3720

**NXP i.MX8M Plus Cortex®-A53
2.5" SBC with UIO40-Express**

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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.

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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 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-3720 SBC (With Heat Sink: 1970004819T001)

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 No.	Description
RSB-3720CD-BCA1E	2.5" UIO SBC NXP i.MX8M Plus Dual, 4GB, 0~60°C
RSB-3720WD-BCA1E	2.5" UIO SBC NXP i.MX8M Plus Dual, 4GB, -40~85°C
RSB-3720CQ-ACA1E	2.5" UIO SBC NXP i.MX8M Plus Quad, 6GB, 0~60°C
RSB-3720WQ-ACA1E	2.5" UIO SBC NXP i.MX8M Plus Quad, 6GB, -40~85°C

Optional Accessories

Part No.	Description
96PSA-A36W12W7-5	ADP A/D 100-240V 36W 12V C6 LOCK DC JACK 62368
1700001524	Power Cord 3P UL 10A 125V 180cm
170203183C	Power Cord 3P Europe (WS-010+WS-083) 183cm
170203180A	Power Cord 3P UK 2.5A/3A 250V 1.83M
1700008921	Power Cord 3P PSE 183cm
1700100250	Debug cable 10P-2.0/D-SUB 9P(M) 25CM
1700019474	D-SUB 9P(F)/D-SUB 9P(F) RS232/RS485 100c
1700031429-01	Line out cable
1700026878-01	Mic in cable
96LEDK-A070WV40NB1	LVDS 7" Panel G070VW01 V0 (VDD: 3.3V, Backlight Power: 12V)
1700021883-01	LVDS Cable
1700032155-01	LVDS BKLT Cable
EWM-W163M201E	802.11 a/b/g/n/ac,QCA6174A,2T2R,w/BT4.1,M.2 2230
1750008717-01	Dipole Ant. D.B 2.4/5G WIFI 3dBi SMA/M-R BLK
1750007965-01	Antenna Cable R/P SMA (M) to MHF4, 300mm
EWM-C117FL06E*	LTE 4G,3G WCDMA/DC-HSPA+, 2G module, MPC1-L280H
1750007990-01	Antenna 4G/LTE full band L=11 cm 50 Ohm
1750006009	Antenna Cable SMA (F) to MHF 1.32 25cm

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

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Chapter 1

General Introduction

This chapter includes background information regarding RSB-3720.

- Introduction
- Specification

1.1 Introduction

Powered by NXP's i.MX 8M Plus Processor, which is the first Cortex®-A53 based SoC integrated with NPU (Neural Processing Unit), RSB-3720 is capable of providing outstanding Edge AI inference at 2.3 TOPS to perform well on Object Detection as well as Image Segmentation. To stand on the front of the Edge AI trend, RSB-3720, a compact-sized 2.5" Single Board Computer is best used for Edge AI Gateway and vision-based system for factory automation. Upon the standard I/Os on the coastline, RSB-3720 also offers the possibility of I/O Extension by UIO40-Express to provide flexible I/Os like more USB, COM, LAN and CAN for each of your specific vertical requirements.

1.1.1 Product Features

		RSB-3720
Form Factor		2.5" UIO40-Express SBC
Processor System	CPU	NXP i.MX8M Plus Cortex-A53 Dual / Quad core (up to 1.8GHz)
	Technology	LPDDR4 4000MT/s
Memory	Capacity	On-board 4 GB / 6 GB
	Flash	16 GB eMMC Flash for O.S. and 8 MB QSPI NOR Flash for board information
NPU		2.3 TOPS Neural Network performance
Graphics	HDMI	1 HDMI 2.0a, up to 3840 x 2160 at 30Hz
	LVDS	1 Single Channel or 1 Dual Channel 24 Bit LVDS, Backlight Power: 5V/12V, Max. 1A
	MIPI-DSI	1 4-Lane MIPI-DSI (shared with LVDS connector by BOM option)
	Graphics Engine	GC7000UL with 2D/3D Graphic Acceleration supporting 1G Pixel/s, OpenVG 1.1, Open GL ES3.1, Vulkan, and Open CL 1.2 FP.
	H/W Video Codec	Decoder: 1080p60 HEVC/H.265 Main, VP9 Profile 0/2, VP8, AVC/H.264 Baseline/Main/High Encoder: 1080p60 AVC/H.264, HEVC/H.265
Ethernet	Chipset	NXP i.MX8M Plus integrated RGMII
	Speed	2 10/100/1000 Mbps
WatchDog Timer		1~6553s, power on/off 4s
TPM		TPM 2.0 (ST33HTPH2E32AHB8)
RTC		RTC Battery by 2pin type connector
Reset		1 Reset Button
I/O	USB	1 USB 3.2 Gen 1 By 1 Host, 1 USB 2.0 Host
	Audio	1 Mic-in / 1 Line-Out by pin header
	CAN	1 CANBus for RSB-3720CD/CQ or 1 CAN-FD for RSB-3720WD/WQ by COM1 pin header*
	Serial Port	1 4 wires RS-232/422/485 by pin header* (default configured as debug console)
	Camera Input	2 4-Lane MIPI-CSI2
Rear I/O	UIO40-Express	1 USB3.2 Gen1 By 1, 3 USB2.0, 10 GPIO, 2 UART, 1 CANBus, 1 I2C
Indicator	LED	1 Green Power LED
		1 Blue Programmable LED
Expansion	Mini PCIe	1 Full Size MiniPCIe Slot (USB Signal Only)
	M.2	1 M.2 2230 Key E Slot (USB/PCIe/SDIO/UART/I2S)
	SD Socket	1 Micro SD Socket
	SIM Slot	1 Nano SIM Slot
Power	Power Supply Voltage	12V DC-IN by lockable DC Jack (or 2pin type connector by BOM option)
	Power Consumption	7.13W
Environment	Operational Temperature	0 ~ 60°C / -40 ~ 85°C
	Operating Humidity	5%~95% Relative Humidity, noncondensing
Mechanical	Dimensions (W x D x H)	100 x 72 x 19mm
	Weight	0.05KG (0.25KG with Heat Sink)
Operating System		Yocto 3.0 Linux & Android 10
Certifications		CE/FCC Class B

1.1.2 Mechanical Specifications

- Dimensions: 100*72mm
- Height: 19mm
- Reference Weight: 0.05kg (0.25kg with Heat Sink)

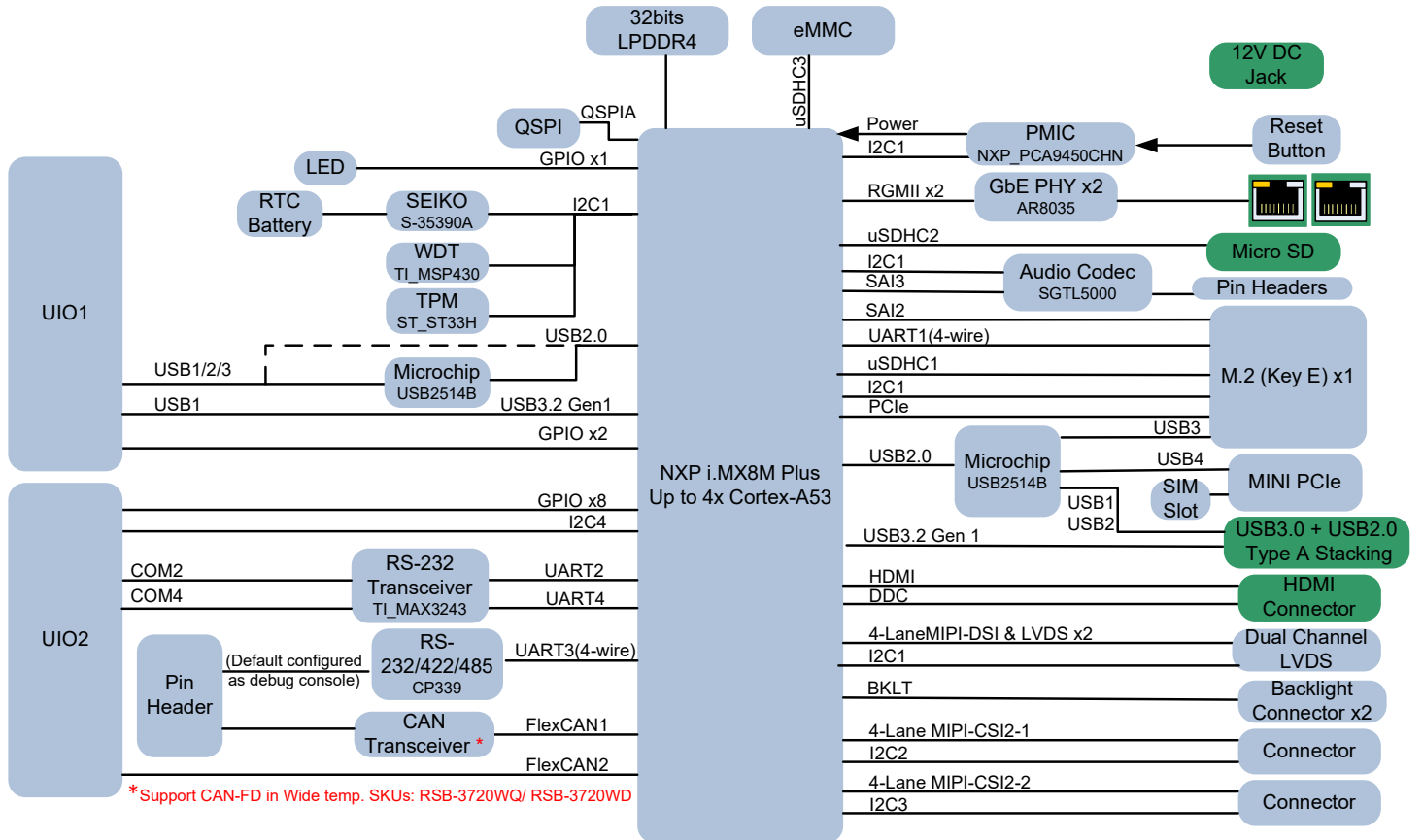
1.1.3 Electrical Specifications

- 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 ~ 140 °F; -40 ~ 85 °C/-40 ~ 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



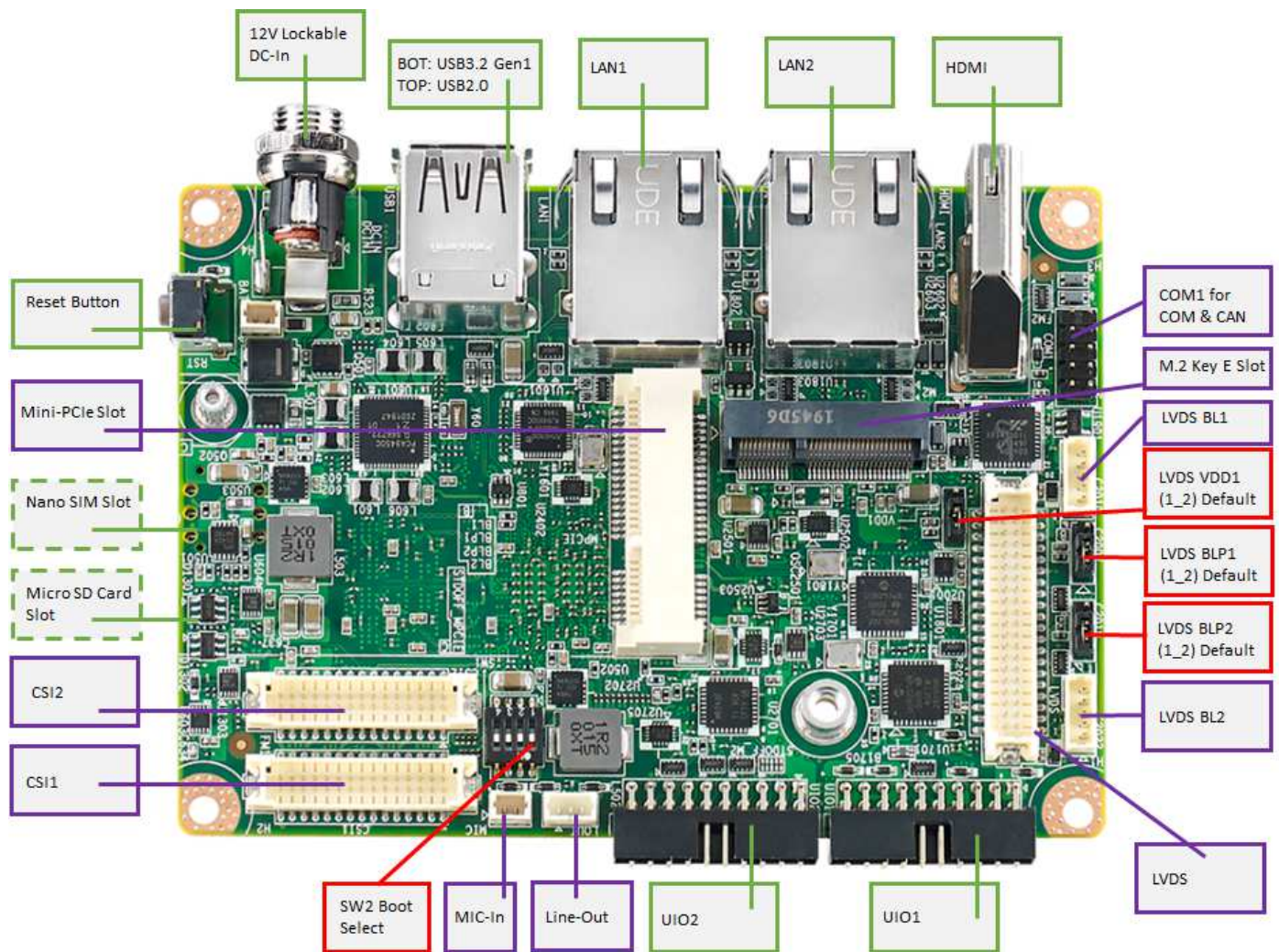
Chapter 2

Hardware Installation

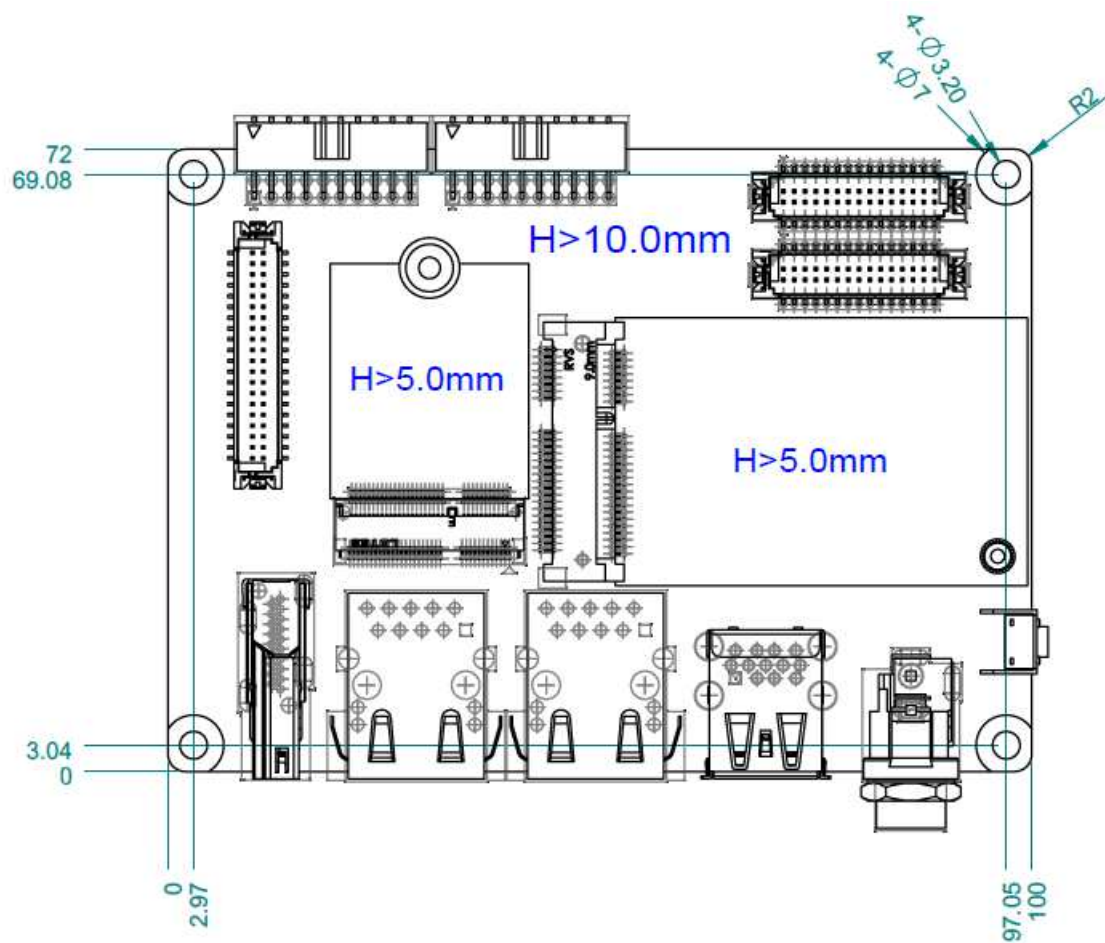
This chapter provides mechanical and connector information.

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

2.1 Jumper and Connector Locations



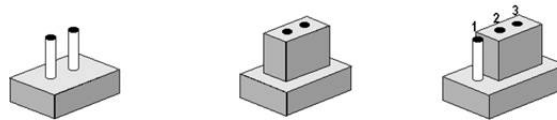
2.2 Board Dimensions



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, 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	
BLP1	Backlight Power Select for LVDS0 (Default 5V)
BLP2	Backlight Power Select for LVDS1 (Default 5V)
VDD1	LVDS VDD (Default 3.3V)
SW2	Boot Mode Select (Default boot from eMMC)

2.3.3 Jumper Settings

2.3.3.1 BLP1

BLP1	Backlight Power Select for LVDS0
Part Number	1653003101
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1_2)	5V (Default)
(2_3)	12V

BLP1
PH_3x1V_2.00mm



2.3.3.2 BLP2

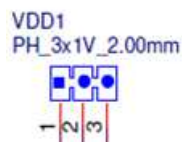
BLP2	Backlight Power Select for LVDS1
Part Number	1653003101
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1_2)	5V (Default)
(2_3)	12V

BLP2
PH_3x1V_2.00mm



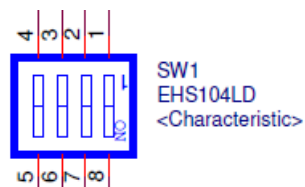
2.3.3.3 VDD1

VDD1	LVDS VDD
Part Number	1653003101
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1_2)	3.3V (Default)
(2_3)	5V



2.3.3.4 SW1

SW1		Boot Mode Select		
Part Number		1600000097		
Description		DIP SW SMD 4P P=1.27mm WO/Pb EHS104LD ECE		
1	2	3	4	Feature
OFF	ON	OFF	OFF	eMMC Boot (Default)
ON	ON	OFF	OFF	SD Boot
OFF	ON	ON	OFF	QSPI Boot
ON	OFF	OFF	OFF	USB Serial Download (USB OTG Port is reserved only, please contact us for Serial Download Mode Solution)



2.4 Connectors

2.4.1 Connector List

BAT	RTC Battery CONN.
BL1	LVDS Backlight 1
BL2	LVDS Backlight 2
COM1	COM + CAN Pin Header (default as debug console)
CSI1	MIPI-CSI Camera Input 1
CSI2	MIPI-CSI Camera Input 2
DCIN/DCIN1	12V DC Power Input by DC Jack/ by Pin Header
HDMI	HDMI CONN.
LAN1	Ethernet 1
LAN2	Ethernet 2
LOUT	Line Out Pin Header
LVDS	LVDS CONN.
M2	M.2 Key E CONN.
MIC	MIC In Pin Header
MPCIE	Mini-PCle CONN.
RST	Reset Button
SD	SD Slot
SIM	SIM Slot
UIO1	UIO40-Express Pin Header 1
UIO2	UIO40-Express Pin Header 2
USB1	USB CONN. (USB 3.2 Gen 1 on TOP + USB 2.0 on BOT)

2.4.2 Connector Settings

2.4.2.1 BAT (RTC Battery CONN.)

RSB-3720 supports 1 2-pin type connector for RTC Battery.

Pin	Pin Name	Pin	Pin Name
1	+COIN_RTC	2	GND

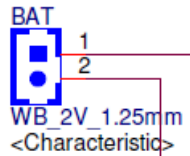


Figure 2.1 BAT (RTC Battery CONN.)

2.4.2.2 BL1 (LVDS Backlight 1)

RSB-3720 supports 1 LVDS Backlight CONN. for each channel, pin definition for the 1st channel as below:

Pin	Pin Name	Pin	Pin Name
1	+12V	2	GND
3	LCD_BKLTO_EN	4	LCD_BKLTO_PWM
5	+5V	-	-

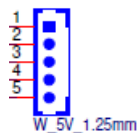


Figure 2.1 BL1 (LVDS Backlight 1)

2.4.2.3 BL2 (LVDS Backlight 2)

RSB-3720 supports 1 LVDS Backlight CONN. for each channel, pin definition for the 2nd channel as below:

Pin	Pin Name	Pin	Pin Name
1	+12V	2	GND
3	LCD_BKLT1_EN	4	LCD_BKLT1_PWM
5	+5V	-	-

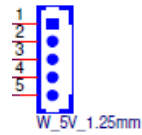


Figure 2.3 BL2 (LVDS Backlight 2)

2.4.2.4 COM1 (COM + CAN Pin Header): (default as debug console)

RSB-3720 supports COM1 Pin Header for 1 4-wires COM port (Can be define as RS-232/RS-422/RS-485 by S/W setting), default set as RS-232 debug console + 1 CANBus (Supports CAN-FD with industrial temp. SKU: RSB-3720WQ/RSB-3720WD) pin definition as below:

Pin	Pin Name	Pin	Pin Name
1	COM_DCD	2	CAN1_H
3	COM_RXD	4	COM_RTS
5	COM_TXD	6	COM_CTS
7	COM_DTR	8	CAN1_L
9	GND	10	GND

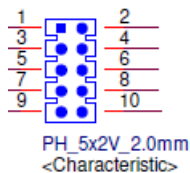


Figure 2.4 COM1 (COM + CAN Pin Header)

2.4.2.5 CSI1 (MIPI-CSI Camera Input 1)

RSB-3720 supports 2 4-Lane MIPI-CSI Camera Input CONNs, CSI1 is for MIPI-CSI1, pin definition as below:

Pin	Pin Name	Pin	Pin Name
1	GND	2	GND
3	MIPI_CSI1_D0-	4	MIPI_CSI1_CLK-
5	MIPI_CSI1_D0+	6	MIPI_CSI1_CLK+
7	GND	8	GND
9	MIPI_CSI1_D1-	10	I2C2_CSI1_SCL
11	MIPI_CSI1_D1+	12	I2C2_CSI1_SDA
13	GND	14	+V1.8
15	CLKO1	16	+V1.8
17	GND	18	CSI1_PWR_EN#
19	MIPI_CSI1_D2-	20	CSI1_RST#
21	MIPI_CSI1_D2+	22	+V3.3
23	GND	24	+V3.3
25	MIPI_CSI1_D3-	26	CSI1_SYNC
27	MIPI_CSI1_D3+	28	+5V
29	GND	30	+5V

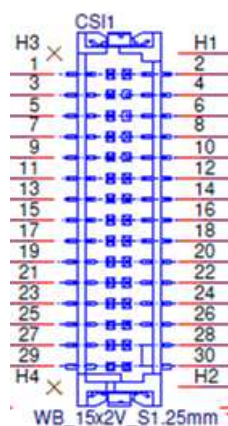


Figure 2.5 CSI1 (MIPI-CSI Camera Input 1)

2.4.2.6 CSI2 (MIPI-CSI Camera Input 2)

RSB-3720 supports 2 4-Lane MIPI-CSI Camera Input CONNs, CSI2 is for MIPI-CSI2, pin definition as below:

Pin	Pin Name	Pin	Pin Name
1	GND	2	GND
3	MIPI_CSI2_D0-	4	MIPI_CSI2_CLK-
5	MIPI_CSI2_D0+	6	MIPI_CSI2_CLK+
7	GND	8	GND
9	MIPI_CSI2_D1-	10	I2C3_CSI2_SCL
11	MIPI_CSI2_D1+	12	I2C3_CSI2_SDA
13	GND	14	+V1.8
15	CLKO2	16	+V1.8
17	GND	18	CSI2_PWR_EN#
19	MIPI_CSI2_D2-	20	CSI2_RST#
21	MIPI_CSI2_D2+	22	+V3.3
23	GND	24	+V3.3
25	MIPI_CSI2_D3-	26	CSI2_SYNC
27	MIPI_CSI2_D3+	28	+5V
29	GND	30	+5V



Figure 2.6 CSI2 (MIPI-CSI Camera Input 2)

2.4.2.7 DCIN/ DCIN1 (12V DC Power Input by DC Jack/ by Pin Header)

Power input for RSB-3720 is 12V, we design DC Jack and 2 pin type Pin Header co-layout, default SKU is by lockable DC Jack.

DCIN: (Default)

Pin	Pin Name	Pin	Pin Name
1	+12V	2	GND
3	GND	-	-

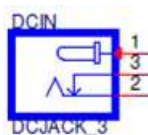


Figure 2.7.1 DCIN (12V DC Jack)

DCIN1 (By BOM Option):

Pin	Pin Name	Pin	Pin Name
1	+12V	2	GND

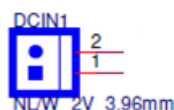


Figure 2.7.2 DCIN1 (12V DC-IN Pin Header)

2.4.2.8 HDMI (HDMI CONN.)

RSB-3720 supports 1 HDMI 2.0 CONN. on the coast line.

Pin	Pin Name	Pin	Pin Name
1	HDMI_TD2+	2	GND
3	HDMI_TD2-	4	HDMI_TD1+
5	GND	6	HDMI_TD1-
7	HDMI_TD0+	8	GND
9	HDMI_TD0-	10	HDMI_CLK+
11	GND	12	HDMI_CLK-
13	HDMI_CEC	14	HDMI_Utility/ eARC+
15	HDMI_DDC_SCL	16	HDMI_DDC_SDA
17	GND	18	+5V
19	HDMI_HPD/ eARC-	-	-

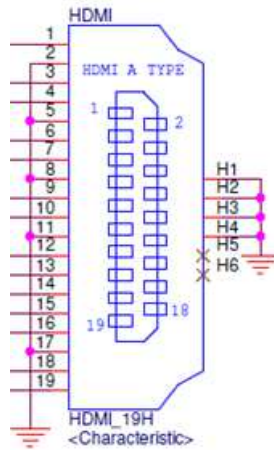


Figure 2.8 HDMI (HDMI CONN.)

2.4.2.9 LAN1 (Ethernet eth0)

LAN1 supports 10M/100M/1G.

Pin	Pin Name	Pin	Pin Name
1	LAN1_MDI0+	2	LAN1_MDI0-
3	LAN1_MDI1+	4	LAN1_MDI1-
5	GND	6	GND
7	LAN1_MDI2+	8	LAN1_MDI2-
9	LAN1_MDI3+	10	LAN1_MDI3-
11	LAN1_ACT#	12	+2.5V_VDDH1
13	LAN1_LED_1000#	14	LAN1_LED_10_100#

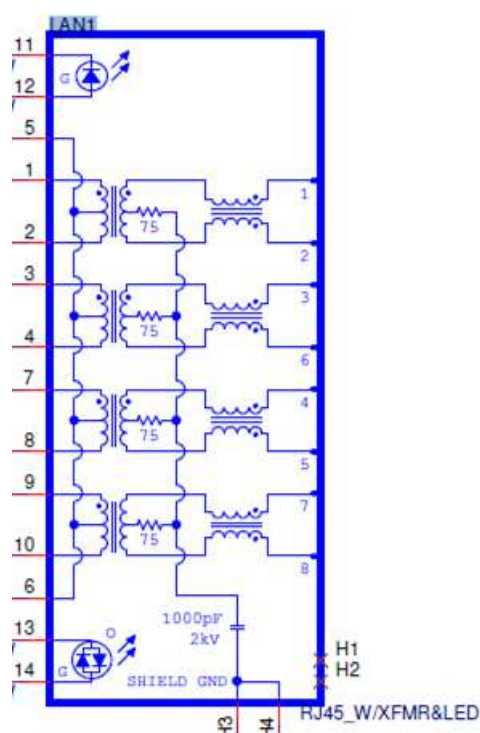


Figure 2.9 LAN1 (Ethernet eth0)

2.4.2.10 LAN2 (Ethernet eth1)

LAN2 supports 10M/100M/1G.

Pin	Pin Name	Pin	Pin Name
1	LAN0_MDIO+	2	LAN0_MDIO-
3	LAN0_MDIO1+	4	LAN0_MDIO1-
5	GND	6	GND
7	LAN0_MDIO2+	8	LAN0_MDIO2-
9	LAN0_MDIO3+	10	LAN0_MDIO3-
11	LAN0_ACT#	12	+2.5V_VDDH0
13	LAN0_LED_1000#	14	LAN0_LED_10_100#

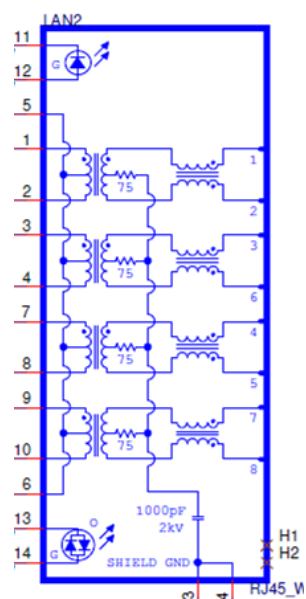


Figure 2.10 LAN2 (Ethernet eth1)

2.4.2.11 LOUT (Line Out Pin Header)

Pin	Pin Name	Pin	Pin Name
1	LINEOUT_L	2	LINEOUT_R
3	GND	-	-

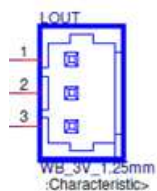


Figure 2.11 LOUT (Line Out Pin Header)

2.4.2.12 LVDS (LVDS CONN.)

RSB-3720 supports 1 single channel LVDS @LVDS0, 1 4-Lane MIPI-DSI @LVDS1, and can be configured as 1 dual channel LVDS.

Pin	Pin Name	Pin	Pin Name
1	+VDD_LVDS	2	+VDD_LVDS
3	GND	4	GND
5	+VDD_LVDS	6	+VDD_LVDS
7	LVDS0_D0-	8	DSI/LVDS1_D0-
9	LVDS0_D0+	10	DSI/LVDS1_D0+
11	GND	12	GND
13	LVDS0_D1-	14	DSI/LVDS1_D1-
15	LVDS0_D1+	16	DSI/LVDS1_D1+
17	GND	18	GND
19	LVDS0_D2-	20	DSI/LVDS1_D2-
21	LVDS0_D2+	22	DSI/LVDS1_D2+
23	GND	24	GND
25	LVDS0_CLK-	26	DSI/LVDS1_CLK-
27	LVDS0_CLK+	28	DSI/LVDS1_CLK+
29	GND	30	GND
31	I2C1_SCL_LVDS	32	I2C1_SDA_LVDS
33	GND	34	GND
35	LVDS0_D3-	36	DSI/LVDS1_D3-
37	LVDS0_D3+	38	DSI/LVDS1_D3+
39	GND	40	LVDS_CTRL
41	-	42	-
43	GND	44	GND

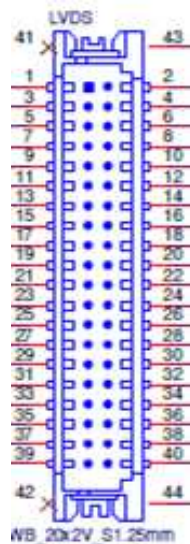


Figure 2.12 LVDS (LVDS CONN.)

2.4.2.13 M2 (M.2 Key E CONN.)

RSB-3720 supports 1 M.2 Key E CONN. for extension, interfaces: USB/PCIe/SDIO/UART/I2S.

Pin	Pin Name	Pin	Pin Name
1	GND	2	+3.3V
3	USB_M2_0+	4	+3.3V
5	USB_M2_0-	6	-
7	GND	8	SAI2_TXC
9	SD1_CLK	10	SAI2_TXFS
11	SD1_CMD	12	SAI2_RXD0
13	SD1_DATA0	14	SAI2_TXD0
15	SD1_DATA1	16	-
17	SD1_DATA2	18	GND
19	SD1_DATA3	20	UART1_WAKE#_3V3
21	SD1_WAKE#	22	UART1_RXD
23	SD1_RESET#	-	-
Key			
33	GND	32	UART1_TXD
35	PCIE_TX+	34	UART1_CTS#
37	PCIE_TX-	36	UART1_RTS#
39	GND	38	-
41	PCIE_RX+	40	-
43	PCIE_RX-	42	-
45	GND	44	-
47	PCIE_REF_CLK_OUT+	46	-
49	PCIE_REF_CLK_OUT-	48	-
51	GND	50	M2_SYSCLK_3V3
53	PCIE_CLKREQ#	52	M2_RESET#_3V3
55	+3.3V	54	M2_W_DIS2#_3V3
57	GND	56	M2_W_DIS1#_3V3
59	-	58	I2C1_SDA
61	-	60	I2C1_SCL
63	GND	62	M2_IRQ#
65	-	64	-
67	-	66	-
69	GND	68	-
71	-	70	-
73	-	72	+3.3V
75	GND	74	+3.3V

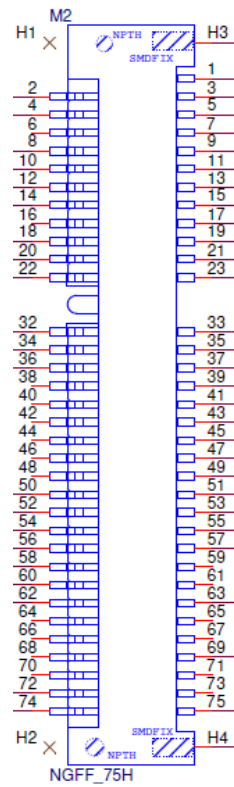


Figure 2.13 M2 (M.2 Key E CONN.)

2.4.2.14 MIC (MIC In Pin Header)

Pin	Pin Name	Pin	Pin Name
1	MIC_IN	2	GND



Figure 2.14 MIC (MIC In Pin Header)

2.4.2.15 MPCIE (Mini-PCle CONN.)

RSB-3720 supports 1 Full size Mini-PCle CONN. for extension, interface: USB.

Pin	Pin Name	Pin	Pin Name
1	-	2	GND
3	-	4	MINICARD_DET#_3V3
5	-	6	-
7	-	8	UIM_VCC
9	GND	10	UIM_DATA
11	-	12	UIM_CLK
13	-	14	UIM_RESET
15	GND	16	-
Key			
17	-	18	GND
19	-	20	MICICARD_W_DIS#_3V3
21	GND	22	MINICARD_RESET#_3V3
23	-	24	+3.3V
25	-	26	GND
27	GND	28	-
29	GND	30	-
31	-	32	-
33	-	34	GND
35	GND	36	USB_MINICARD-
37	GND	38	USB_MINICARD+
39	+3.3V	40	GND
41	+3.3V	42	-
43	GND	44	-
45	-	46	-
47	-	48	-
49	-	50	GND
51	-	52	+3.3V

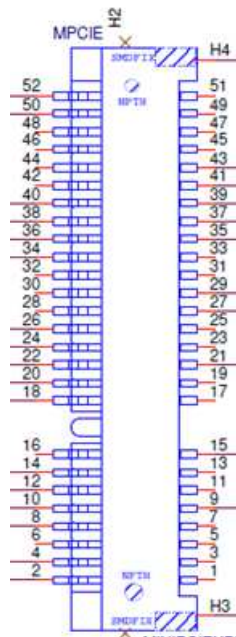


Figure 2.15 MPCIE (Mini-PCle CONN.)

2.4.2.16 RST (Reset Button)

Pin	Pin Name	Pin	Pin Name
1	RESET_IN#	2	GND
3	GND	4	GND

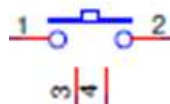


Figure 2.16 RST (Reset Button)

2.4.2.17 SD (SD Slot)

RSB-3720 supports 1 Micro SD Slot.

Pin	Pin Name	Pin	Pin Name
1	SDCARD_DAT2	2	SDCARD_DAT3
3	SDCARD_CMD	4	+3.3V
5	SDCARD_CLK	6	GND
7	SDCARD_DAT0	8	SDCARD_DAT1
H1	GND	H2	+VDD_SD2
H3	GND	H4	GND

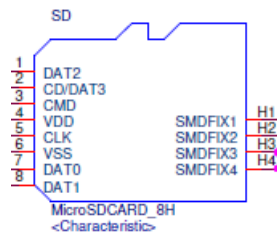


Figure 2.17 SD (SD Slot)

2.4.2.18 SIM (SIM Slot)

RSB-3720 supports 1 Nano SIM Slot.

Pin	Pin Name	Pin	Pin Name
C1	UIM_PWR	C2	UIM_RESET
C3	UIM_CLK	-	-
C5	GND	C6	-
C7	UIM_DATA	CD	-

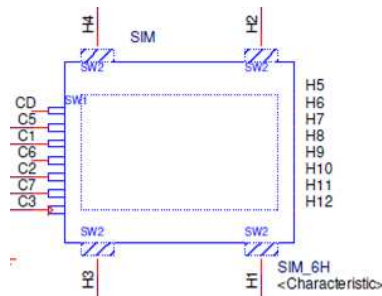


Figure 2.18 SIM (SIM Slot)

2.4.2.19 UIO1 (UIO40-Express Pin Header 1)

RSB-3720 supports I/O extension by supporting UIO40-Express standard, UIO1 connector pinout is as the following:

Pin	Pin Name	Pin	Pin Name
1	5V_USB1	2	GND
3	USB1_D-	4	USB2_D+
5	USB1_D+	6	USB2_D-
7	GND	8	5V_USB2
9	USB3_SSTX-	10	GPIO2
11	USB3_SSTX+	12	GPIO4
13	5V_USB3	14	GND
15	USB3_D-	16	USB3_SSRX+
17	USB3_D+	18	USB3_SSRX-
19	GND	20	5V_USB3

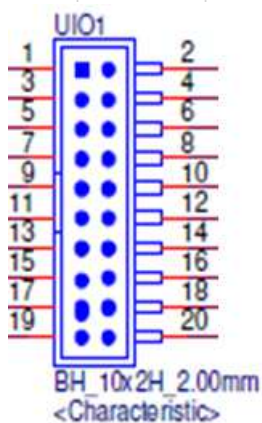


Figure 2.19 UIO1 (UIO40-Express Pin Header 1)

2.4.2.20 UIO2 (UIO40-Express Pin Header 2)

RSB-3720 supports I/O extension by supporting UIO40-Express standard, UIO2 connector pinout is as the following:

Pin	Pin Name	Pin	Pin Name
1	5V	2	GND
3	COM2_TXD	4	COM4_TXD
5	COM2_RXD	6	COM4_RXD
7	GPIO5	8	GPIO6
9	GPIO7	10	GPIO8
11	GPIO9	12	GPIO10
13	GPIO11	14	GPIO12
15	CAN2_TXD	16	I2C4_SDA
17	CAN2_RXD	18	I2C4_SCL
19	3.3V	20	GND

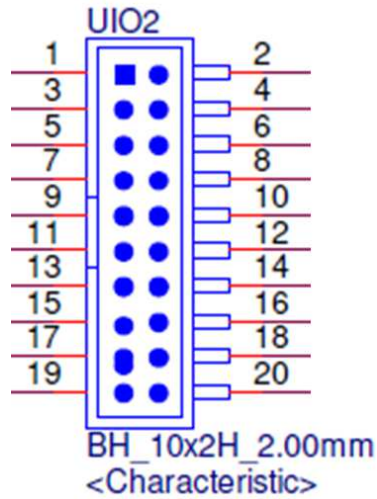


Figure 2.20 UIO2 (UIO40-Express Pin Header 2)

2.4.2.21 USB1 (USB 3.2 Gen 1 on TOP + USB 2.0 on BOT)

Pin	Pin Name	Pin	Pin Name
1	+VBUS_ USB5	2	USB5_ D-
3	USB5_ D+	4	GND
5	USB5_ SSRX-	6	USB5_ SSRX+
7	GND	8	USB5_ SSTX-
9	USB5_ SSTX+	10	+VBUS_ USB6
11	USB6_ D-	12	USB6_ D+
13	GND	-	-
H1	GND	H2	GND
H3	GND	H4	GND

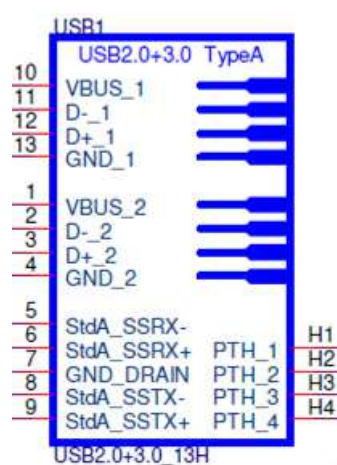


Figure 2.21 USB1 (USB 3.2 Gen 1 on TOP + USB 2.0 on BOT)



2.5 LED

Name	Description	Function
LED_PWR	LED GREEN SMD 0603 2P LTST-C191KGKT	Show Power Status
LED_USER	LED BLUE SMD 0603 19-215SUBC/S280/TR8	Software Programmable: Method will be provided in chapter 3.

2.6 Quick Start Guide

2.6.1 Debug Port Connection And Setting

1. RSB-3720 Debug port is shared with COM1, please connect debug console cable 1700100250 & 1700019474 together and connect to your USB-to-RS232 Cable to your PC terminal, connect the cable to COM1 pin header nearby the HDMI connector. *Note: Debug cable needs to be purchased separately.*

Part No.	Description	Photo
1700100250	10P-2.0/D-SUB 9P(M) 25CM	
1700019474	RS-232 Cable DB9 female to DB9 female	

2. RSB-3720 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 as the below describes the serial terminal setup using Tera Term on a Windows host: Open Tera Term on your Windows PC, and select the settings as shown in Figure 2.3.

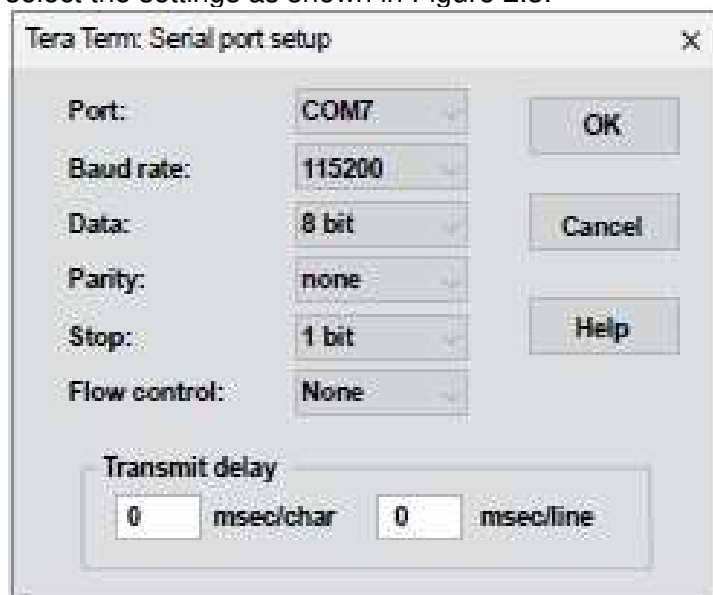


Figure 2.3

3. Connect Display:
RSB-3720's default display interface is HDMI. When you use HDMI display as an example, please connect the HDMI display's cable to RSB-3720's HDMI connector as shown in Figure 2.4.



Figure 2.4

4. Connect The Power Source:
RSB-3720's power input is 12VDC, power interface's location is DCIN1, please choose the suitable adapter and power cord to connect the board (please refer to P/Ns on datasheet and Optional Accessories of this manual) as shown in Figure 2.5.

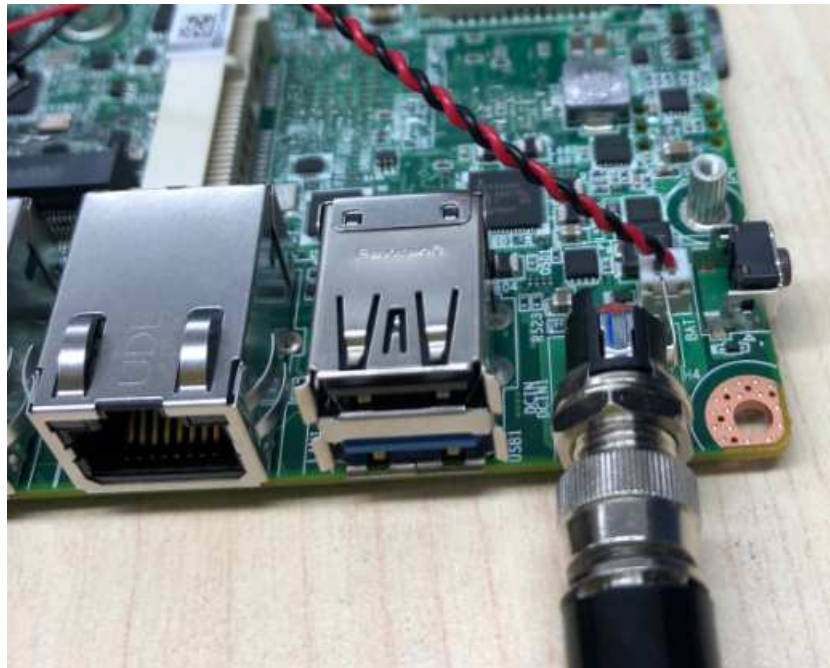


Figure 2.5

When switching on the power, the green LED indicator (location LED_PWR) on BOT side of the board will be lit up to indicate that the board has booted up normally. (Figure 2.6)



Figure 2.6

After booting, the display boot screen is shown in Figure 2.7. The debug window is shown in Figure 2.8.



Figure 2.7

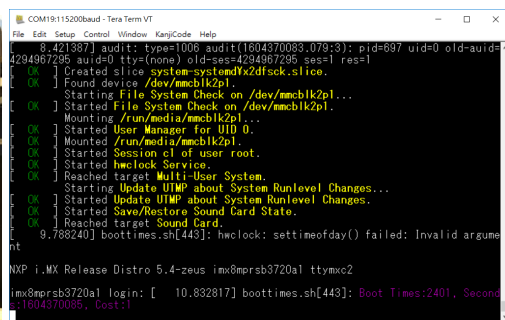


Figure 2.8

Chapter 3

Software Functionality

This chapter details software functions on RSB-3720.

3.1 Display

3.1.1 HDMI

When the HDMI Cable is connected, the default Weston UI(1920x1080) will be displayed on the screen.



3.1.1.1 Test Different Resolutions:

Step 1: Disable Weston UI

```
# killall -9 weston
```

Step 2: Get "connect ID" and "support resolutions "

```
# modetest -c
```

```
id  encoder status  name      size (mm)  modes  encoders
46  45   connected  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:
preferred, 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:
```

Step 3: Play colorbar of the specified resolution on HDMI

```
# modetest -s 46:1920x1080-60
```


- Display test (single LVDS0 or single LVDS1)

The default Weston UI will be displayed on the screen

- LVDS0 - g070vw01v0(VDD:3.3V, Backlight Power:12V)

- ◆ Step 1: Connect LVDS VDD and Backlight Power cable
- ◆ Step 2: power on
- ◆ Step 3: press enter after boot, system will stop at u-boot as below:

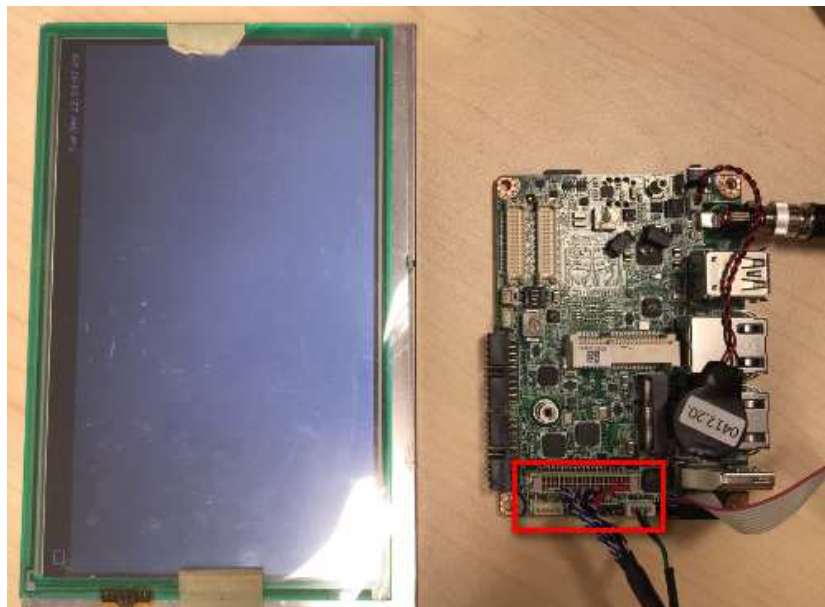
```
Normal Boot
```

```
Hit any key to stop autoboot:  0
```

```
u-boot=>
```

```
u-boot=>setenv fdt_file imx8mp-rsb3720-a1-lvds0-auo.dtb; boot
```

- ◆ Step 4: Weston UI will be displayed on the screen.



- LVDS1 - g070vw01v0(VDD:3.3V, Backlight Power:12V)

- ◆ Step 1: Connect LVDS VDD and Backlight Power cable
- ◆ Step 2: power on
- ◆ Step 3: press enter after boot, system will stop at u-boot as below:

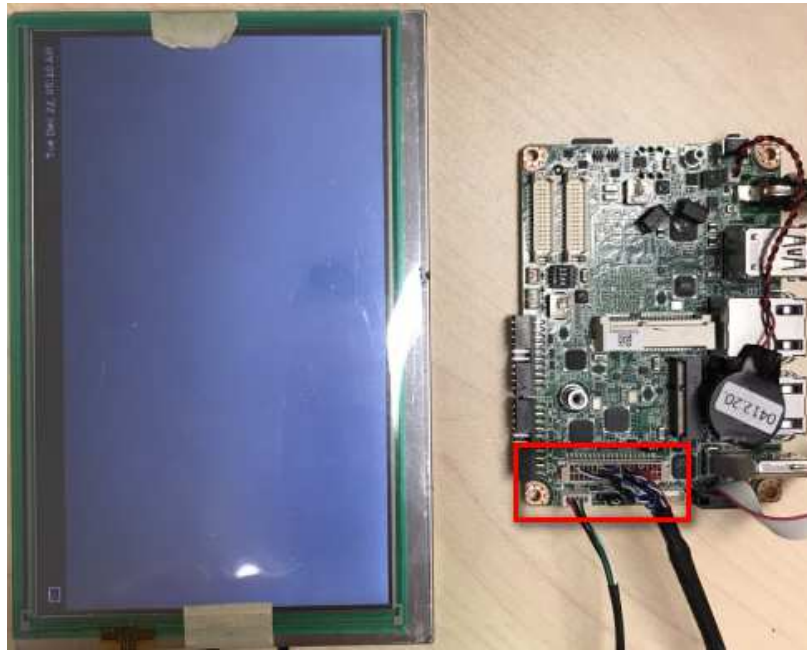
```
Normal Boot
```

```
Hit any key to stop autoboot:  0
```

```
u-boot=>
```

```
u-boot=>setenv fdt_file imx8mp-rsb3720-a1-lvds1-auo.dtb; boot
```

- ◆ Step 4: Weston UI will be displayed on the screen.



- Dual Channel LVDS - g215hvn0 (VDD:5V, Backlight Power:12V)
 - ◆ Step 1: Connect two LVDS VDD and Backlight Power cable
 - ◆ Step 2: power on
 - ◆ Step 3: press enter after boot, system will stop at u-boot as below:

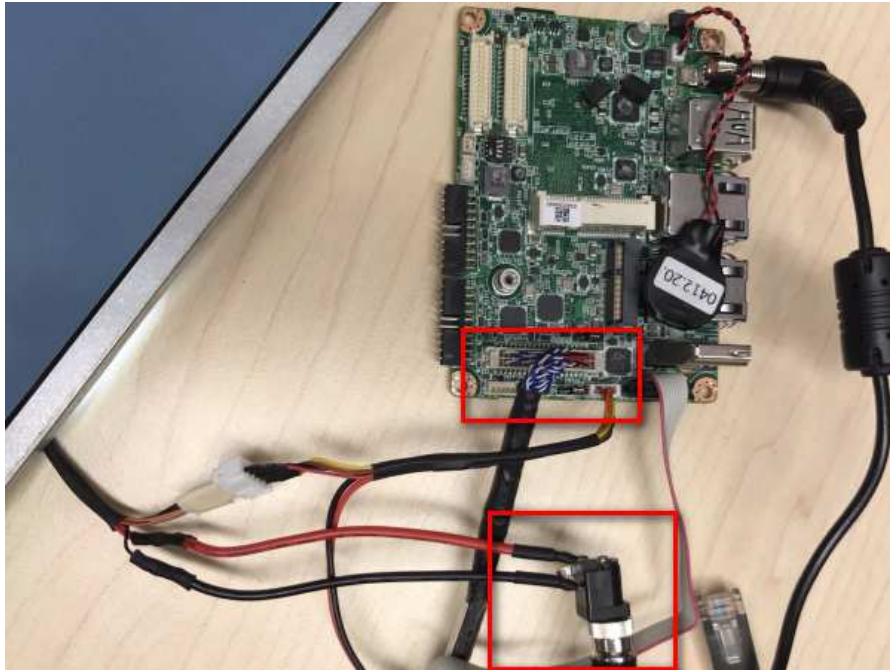
Normal Boot

Hit any key to stop autoboot: 0

u-boot=>

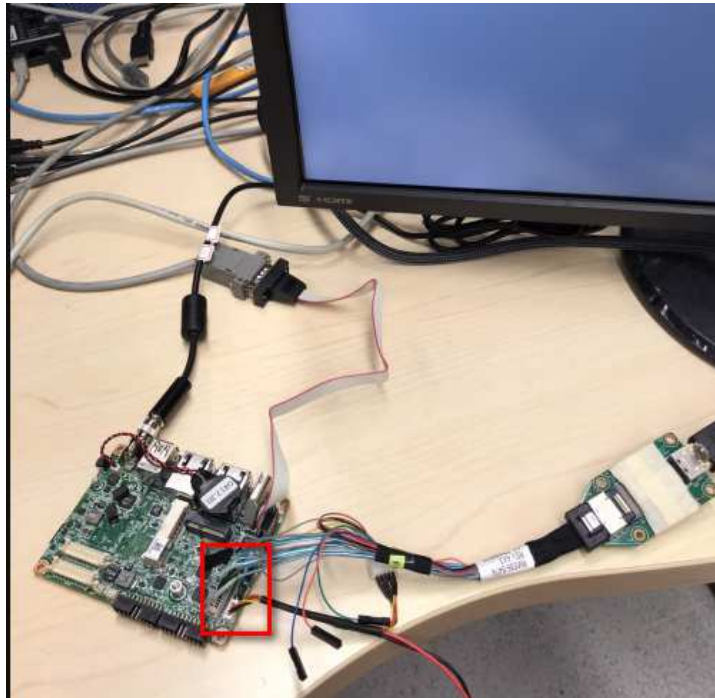
u-boot=> **setenv fdt_file imx8mp-rsb3720-a1-lvds-dual.dtb; boot**

- ◆ Step 4: Weston UI will be displayed on the screen.



- Display test (MIPI to HDMI) (VDD:3.3V, Backlight Power:5V)
 - Step 1: Connect MIPI to HDMI cable to LVDS
 - Step 2: power on
 - Step 3: press enter after boot, system will stop at u-boot as below:

```
Normal Boot
Hit any key to stop autoboot:  0
u-boot=>
u-boot=>setenv fdt_file imx8mp-rsb3720-a1-adv7535.dtb; boot
```
 - Step 4: Weston UI will be displayed on the screen.



- Display test (MIPI DSI- g101uan02) (VDD:3.3V, Backlight Power:5V)
 - Step 1: Connect LVDS VDD and Backlight Power cable
 - Step 2: power on
 - Step 3: press enter after boot, system will stop at u-boot as below:

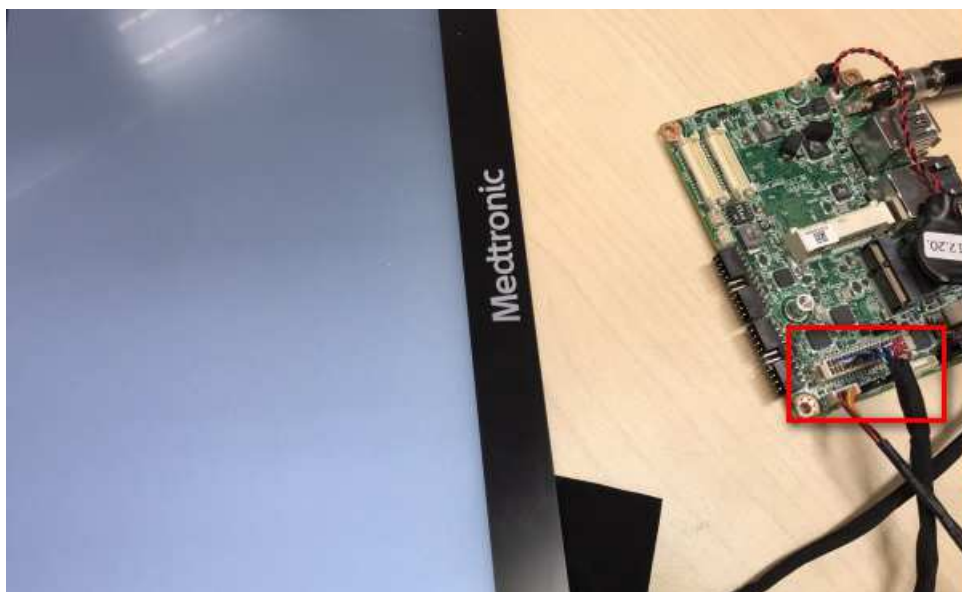
Normal Boot

Hit any key to stop autoboot: 0

u-boot=>

u-boot=> **setenv fdt_file imx8mp-rsb3720-a1-auog101uan02.dtb; boot**

- Step 4: Weston UI will be displayed on the screen.



- Audio test

- Check audio codec

```
# cat /proc/asound/cards
0 [sgtl5000      ]: sgtl5000 - sgtl5000
                    sgtl5000
1 [audiohdmi     ]: audio-hdmi - audio-hdmi
                    audio-hdmi
```

- Audio codec(sgtl5000):

- ◆ 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%]
```

◆ Record and playback

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

● Mini PCIE Test

■ Test 3G/4G (EWM-C117FL06E)

◆ Connect the PCIE card to Mini PCIE slot.



◆ Execute the pppd to connect the network.

```
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99***4#" "CONNECT" ""'  
user username password password /dev/ttyACM2 460800 nodetach crtscts  
debug usepeerdns defaultroute &
```

● M.2 test

■ Test Wifi (EWM-W163M201E - PCIE)

```
# killall wpa_supplicant  
# ifconfig wlan0 up  
# wpa_passphrase "SSID" "PASSWORD" > /tmp/wpa.conf  
# wpa_supplicant -BDwext -iwlan0 -c/tmp/wpa.conf  
# udhcpc -b -i wlan0
```

Ping network

```
ping 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
```

- Test Bluetooth (EWM-W163M201E - USB)

```
$ hciconfig hci0 up
$ bluetoothctl
$ discoverable on
$ pairable on
$ scan on
[NEW] FC:18:3C:8D:75:F4 myphone
$ scan off
$ pair FC:18:3C:8D:75:F4
$ connect FC:18:3C:8D:75:F4
```

- RS-232 test

- Loopback test (eg. ttymxc1)

```
# stty -F /dev/ttymxc1 -echo -onlcr 115200
# cat /dev/ttymxc1 &
# echo "Serial Port Test" > /dev/ttymxc1
```

- RS-485 test

- Set GPIO#496, #497 Set to 0,1

- Test RS-485 with Adam-4520.

```
#!/enable485 /dev/ttymxc2

#stty -F /dev/ttyLP1 speed 115200 ignbrk -brkint -icrnl -imaxbel -opost -onlcr -isig -icanon -
iexten -echo -echoe -echok -echoctl -echoke
#cat /dev/ttymxc2 &
#echo test > /dev/ttymxc2
```

- I2C test

- Check i2c device(audio codec : 0-000a)

```

root@imx8mprsb3720a1:~# i2cdetect -y 0
    0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  UU  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  UU  --  --  --  29  --  --  --  --  UU  --
30:  UU  UU  UU  UU  UU  UU  UU  UU  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  UU  UU  --  --  --  --  --  --  --  --  --  --  --  --  --  --

```

- I2c set and get

```

root@imx8mprsb3720a1:~# i2cset -f -y 0 0x0a 0 0xff00 w
root@imx8mprsb3720a1:~# i2cget -f -y 0 0x0a 0 w
0x11a0

```

- USB test

- USB disk test(2.0/3.0)

- ◆ After insert usb disk to 2.0 or 3.0 port

```

root@imx8mprsb3720a1:~# lsusb -t
/: Bus 04.Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/1p, 5000M
/: Bus 03.Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/1p, 480M
|__ Port 1: Dev 2, If 0, Class=Hub, Driver=hub/4p, 480M
|__ Port 2: Dev 3, If 0, Class=Mass Storage, Driver=usb-storage, 480M
/: Bus 02.Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/1p, 5000M
|__ Port 1: Dev 2, If 0, Class=Mass Storage, Driver=usb-storage, 5000M
/: Bus 01.Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/1p, 480M
|__ Port 1: Dev 2, If 0, Class=Hub, Driver=hub/4p, 480M

```

- ◆ Test (eg. if usb disk is /dev/sda)

```

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

```

- RTC test

- Disable rtc sync service

```

root@imx8mprsb3720a1:~# systemctl disable ntpd.service
Removed /etc/systemd/system/multi-user.target.wants/ntpd.service.
root@imx8mprsb3720a1:~# systemctl stop systemd-timesyncd
root@imx8mprsb3720a1:~# systemctl stop ntpdate.service

```

- set system time to current, then write to RTC


```
root@imx8mpsb3720a1:~# date 021710452016 && hwclock -w && date
Wed Feb 17 10:45:00 UTC 2016
Wed Feb 17 10:45:01 UTC 2016
```

- set one incorrect time, then read time from RTC to verify

```
root@imx8mpsb3720a1:~# 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
```

- restore the RTC time to system time

```
root@imx8mpsb3720a1:~# hwclock -s && date
Wed Feb 17 10:45:13 UTC 2016
```

- eMMC/SD/SPI flash test

- eMMC: /dev/mmcblk2

SD: /dev/mmcblk1

QSPI1: /dev/mtd0

- Test (eg. emmc)

```
# dd if=/dev/urandom of=data bs=1 count=1024
# dd if=/dev/mmcblk0 of=backup bs=1 count=1024 skip=4096
# dd if=data of=/dev/mmcblk0 bs=1 seek=4096
# dd if=/dev/mmcblk0 of=data1 bs=1 count=1024 skip=4096
# diff data data1
# dd if=backup of=/dev/mmcblk0 bs=1 seek=4096
```

- Ethernet test

- Check Ethernet device

```

root@imx8mprsb3720a1:~# ifconfig
eth0      Link encap:Ethernet  HWaddr de:35:e3:67:5c:4d
          inet addr:172.22.28.49  Bcast:172.22.31.255  Mask:255.255.252.0
          inet6 addr: fe80::dc35:e3ff:fe67:5c4d/64  Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:90 errors:0 dropped:10 overruns:0 frame:0
          TX packets:51 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:9589 (9.3 KiB)  TX bytes:9475 (9.2 KiB)

eth0:0    Link encap:Ethernet  HWaddr de:35:e3:67:5c:4d
          inet addr:192.168.0.1  Bcast:192.168.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1

eth1      Link encap:Ethernet  HWaddr de:35:e3:67:5c:4e
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:46

eth1:0    Link encap:Ethernet  HWaddr de:35:e3:67:5c:4e
          inet addr:192.168.1.1  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          Interrupt:46

```

- Connect cable and ping test (eg. Eth0)

```

root@imx8mprsb3720a1:~# ping 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=115 time=3.42 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=115 time=3.44 ms
^C
--- 8.8.8.8 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 3.419/3.431/3.443/0.012 ms
root@imx8mprsb3720a1:~#

```

- GPIO test

- GPIO pin

	number
GPIO2	501
GPIO4	503
GPIO5	504
GPIO6	505
GPIO7	506
GPIO8	507
GPIO9	508
GPIO10	509
GPIO11	139
GPIO12	138

- Loopback test (take GPIO2 and GPIO4 as an example)

- ◆ Step 1: connect GPIO2 and GPIO4
- ◆ Step 2: export GPIO interface

```
root@imx8mpsb3720a1:~# echo 501 > /sys/class/gpio/export
root@imx8mpsb3720a1:~# echo 503 > /sys/class/gpio/export
```

◆ Step 3:set direction

```
root@imx8mpsb3720a1:~# echo out > /sys/class/gpio/gpio1/direction
root@imx8mpsb3720a1:~# echo in > /sys/class/gpio/gpio2/direction
```

◆ Step 4:read value and set output value than check

```
root@imx8mpsb3720a1:~# cat /sys/class/gpio/gpio2/value
0
root@imx8mpsb3720a1:~# echo 1 > /sys/class/gpio/gpio1/value
root@imx8mpsb3720a1:~# cat /sys/class/gpio/gpio2/value
1
```

● Watchdog test

■ System will reboot after 1 sec

```
root@imx8mpsb3720a1:~# /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 timeout value=1 seconds
The actual timeout was set to 10 seconds
Now reading back -- The timeout is 10 seconds

U-Boot SPL 2020.04-3720A1AIM30LIVA0070+g121029b89f (Dec 01 2020 - 08:46:32 +0000)
```

● Camera test(Default MIPI CSI0 and MIPI CSI1 are ov5640)

■ MIPI CSI0 – ov5640

◆ Preview

```
# gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-
raw,width=640,height=480 ! waylandsink
```

◆ Capture

```
# gst-launch-1.0 v4l2src num-buffers=1 device=/dev/video0 ! video/x-raw,width=640,height=480 ! jpegenc ! filesink location=sample.jpeg
```

- MIPI CSI1 – ov5640

- ◆ Preview

```
# gst-launch-1.0 v4l2src device=/dev/video1 ! video/x-raw,width=640,height=480 ! waylandsink
```

- ◆ Capture

```
# gst-launch-1.0 v4l2src num-buffers=1 device=/dev/video1 ! video/x-raw,width=640,height=480 ! jpegenc ! filesink location=sample.jpeg
```

- MIPI CSI0 – Basler Camera

- ◆ Step 1: Connect the DSI to HDMI in 5.4.24 BSP.

- ◆ Step 2: press enter after boot, system will stop at u-boot as below:

```
Normal Boot
Hit any key to stop autoboot: 0
u-boot=>
u-boot=> setenv fdt_file imx8mp-rsb3720-a1-basler.dtb; boot
```

- ◆ Preview

```
# gst-launch-1.0 -v v4l2src device=/dev/video0 ! "video/x-raw,format=YUY2,width=1920,height=1080" ! queue ! imxvideoconvert_g2d ! waylandsink
```

- ◆ Capture

```
# gst-launch-1.0 v4l2src num-buffers=1 device=/dev/video0 ! video/x-raw,width=1920,height=1080 ! jpegenc ! filesink location=sample.jpeg
```

- CAN Bus

- Step 1: UIO-4034 CAN Pin 2 and Pin 7 connect to RSB-3720 COM1 Pin 8 and Pin 2
- Step 2: Set can0 and can1 up

```
root@imx8mpsb3720a1:~# ip link set can0 up type can bitrate 125000
[ 1362.935162] IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
root@imx8mpsb3720a1:~# ifconfig can0 up
root@imx8mpsb3720a1:~# ip link set can1 up type can bitrate 125000
[ 1381.546624] IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
root@imx8mpsb3720a1:~# ifconfig can1 up
```

■ Step 3: candump can0

```
root@imx8mpsb3720a1:~# candump can0 &
[1] 965
```

■ Step 4: cansend can1

```
root@imx8mpsb3720a1:~# cansend can1 1F334455#1122334455667788
root@imx8mpsb3720a1:~# can0 1F334455 [8] 11 22 33 44 55 66 77 88
```

● TPM

■ Using the tpm_test.bin to test

```

root@imx8mprsb3720a1:~# cp /run/media/sda1/tpm_test.bin .
root@imx8mprsb3720a1:~# ls
tpm_test.bin
root@imx8mprsb3720a1:~# ./tpm_test.bin
[TPM Command]
80010000000C0000011440000
[TPM Response]
80010000000A00000100

[TPM Command]
80010000000B00000114301
[TPM Response]
80010000000A00000000

[TPM Command]
8001000000160000017A000000060000010500000001
[TPM Response]
80010000001B000000000100000006000000010000010553544D20

[TPM Command]
8001000000160000017A000000060000010B00000002
[TPM Response]
800100000023000000000100000006000000020000010B004900410000010C44A01A17

```

- LED test
 - LED ON/OFF test

```

# echo 255 > /sys/class/leds/user/brightness
# echo 0 > /sys/class/leds/user/brightness

```

- EEPROM test

```

# echo -n $'\x06\x05\x04\x03\x02\x01' > test
# dd if=test of=/sys/bus/i2c/devices/3-0050/eeprom
# hexdump -C /sys/bus/i2c/devices/3-0050/eeprom -n 64

```

2. System Recovery

- This section provides detail procedures of restoring the eMMC image. If you destroy the onboard flash image by accident, you can recover a system following these steps.

- Recovery by SD card

1. Copy 3720A1AIM30LIVA0070_iMX8MP_flash_tool.tgz package to your desktop.
2. Insert SD card to PC
3. Make a bootable sd card

```
# tar zxvf 3720A1AIM30LIVA0070_iMX8MP_flash_tool.tgz
# cd 3720A1AIM30LIVA0070_iMX8MP_flash_tool/mk_inand/
# sudo ./mkzd-linux.sh /dev/sdg
```

4. Insert SD card and copy 3720A1AIM30LIVA0070_iMX8MP_flash_tool to USB disk
5. Insert USB disk and SD card then Boot from SD
6. Enter usb disk folder, make a bootable emmc

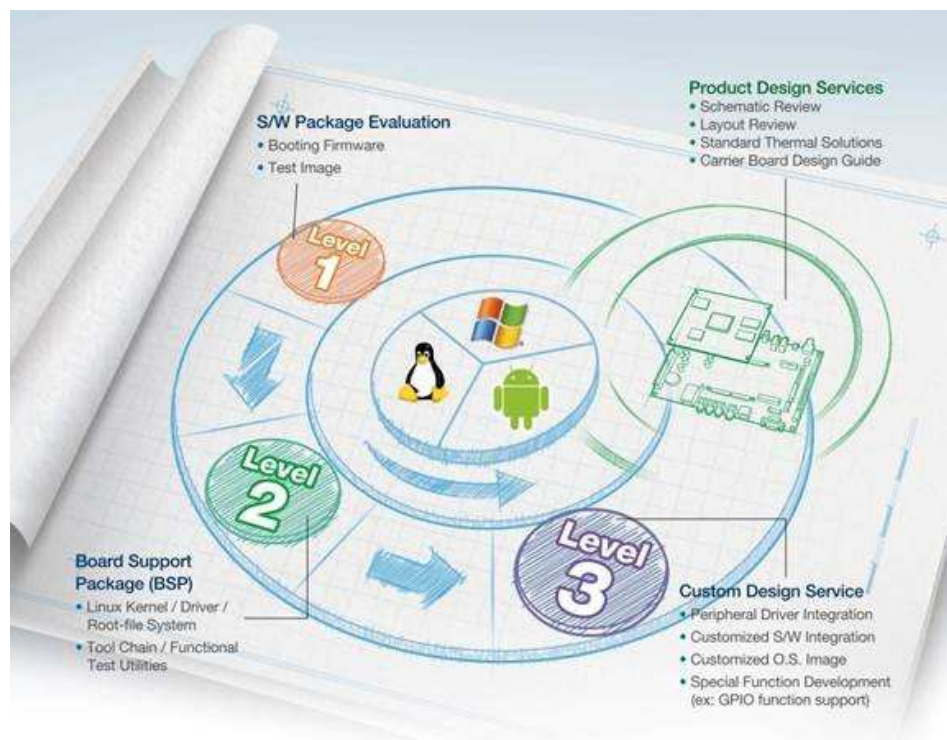
```
# cd /run/media/sda1/
# cd 3720A1AIM30LIVA0070_iMX8MP_flash_tool/mk_inand/
# sudo ./mkzd-linux.sh /dev/mmcblk2
```

Chapter 4

Advantech Services

This chapter outlines Advantech's Design-In services, technical support, and warranty policy for RSB-3720.

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 lightning 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 lightning 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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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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