User Manual

RSB-3810

MediaTek Genio 1200 Cortex A78 & A55 2.5" SBC with UIO40-Express

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

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

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

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

If you believe your product is 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.

Part No. Edition 1

Printed in China October 2023

Declaration of Conformity

FCC Class B

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

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

Technical Support and Assistance

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

Packing List

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

- RSB-3810 SBC with Heat Sink

Ordering Information

Part No.	Description
RSB-3810CO-FCA1E	2.5" UIO SBC MediaTek Genio 1200, 8GB, 0~60 °C (32~140 °F)
RSB-3810WO-FCA1E	2.5" UIO SBC MediaTek Genio 1200, 8GB, -40~85 °C (-40~158 °F)

Optional Accessories

Part Number	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) 183 cm (72 in)
170203180A	Power Cord 3P UK 2.5A/3A 250V 1.83 m (72 in)
1700008921	Power Cord 3P PSE 183 cm (72 in)
TBD	Debug cable 2*5P-2.0/D-SUB9-Mx2 20cm
1700019474	D-SUB 9P(F)/D-SUB 9P(F) RS232/RS485 100c
1700031429-01	Line out cable
1700026878-01	Mic in cable
IDK-1121WR-30FHA1E	21.5" LED panel 300N 1920x1080(G) with 5W touch 96CB-L3040PAF5 LVDS Cable
96CB-E0905PAE3	LVDS BKLT Cable
EWM-W174M201E	IEEE802.11ax+BT 5.2 2T2R MT7921L M.2 2230
1750008717-01	Dipole Ant. D.B 2.4/5G Wi-Fi 3dBi SMA/M-R BLK
1750007965-01	Antenna Cable R/P SMA (M) to MHF4, 300 mm (11.8 in)
TBD	LTE 4G,3G WCDMA/DC-HSPA+, 2G module, MPCI-L280H
1750007990-01	Antenna 4G/LTE full band L=11 cm 50 Ohm
1750006009	Antenna Cable SMA (F) to MHF 1.32 25 cm (9.8 in)

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

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it 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. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. 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 by transient overvoltage.
12. Never pour any 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 one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution – Static Electricity

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

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

Contents

Chapter 1

General Information

This chapter details background information on the RSB-3810.

Sections include:

- Introduction
- Specification

1.1 Introduction

Advantech's RSB-3810 is powered by MediaTek Genio 1200 Processor — Cortex®-A78 & A55 based SoC integrated with NPU (Neural Processing Unit). It is capable of providing outstanding Edge AI inference at 4.8 TOPS and delivers excellent performance to Object Detection and Image Segmentation applications. RSB-3810 is a compact 2.5" Single Board Computer that provides advanced I/O and Extension capabilities using UIO40-Express.

1.1.1 Product Features

Table 1.1: Product Features

Model Name		RSB-3810
Form Factor		2.5" UIO40-Express SBC
Processor System	CPU	MediaTek Genio 1200 4 cores A78 & 4 cores A55
Memory	Technology	LPDDR4 4000MT/s
	Capacity	On-board 8GB
	Flash	32 GB eMMC Flash for O.S. and 8 MB QSPI NOR Flash for board information
NPU		4.8 TOPS Neural Network performance
Graphics	HDMI	1 HDMI 2.0, 4K60
	LVDS	1 dual channel LVDS
	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 Speed	RTL8153 2 x 10/100/1000 Mbps
WatchDog Timer	WatchDog Timer	1~6553s, power on/off 1s
TPM		TPM 2.0 (ST33HTPH2E32AHB8)
RTC	RTC	RTC Battery by 2pin type connector
Reset		1 x Reset Button
I/O	USB	1 USB3.0 Host, 1 USB2.0 Host
	Audio	1 x Mic-in / 1 Line-Out by pin header
	Serial Port	1 x 4 wires RS-232/422/485 by pin header* (default configured as debug console)
	Camera Input	3 4-Lane MIPI-CSI2
Rear I/O	UIO40-Express	1 x USB 3.2 Gen1 By 1, 3 x USB 2.0, 10 x GPIO, 2 x UART, 1 x CANBus, and 1 x I2C
Indicator	LED	1 x Green Power LED 1 x Blue Programmable LED
Expansion	Mini PCIe	1 x Full Size MiniPCIe Slot (USB Signal Only)
	M.2	1 x M.2 2230 Key E Slot (USB/PCIe/SDIO/UART/I2S)
	SD Socket	1 x Micro SD Socket
	SIM Slot	1 x 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

Table 1.1: Product Features		
Environment	Operational Temperature	0 ~ 60/-40 ~ 85 °C (0 ~ 140/ -40 ~ 185 °F)
	Operating Humidity	5 ~ 95% Relative Humidity, non-condensing
Mechanical	Dimensions (W x D x H)	100 x 72 x 19 mm (3.93 x 2.83 x 74 in)
	Weight	0.05 kg/.11 lb (0.25 kg/.55 lb with Heat Sink)
Operating System		Yocto 3.0 Linux & Android 10, Ubuntu 20.04
Certifications		CE/FCC Class B

1.1.2 Mechanical Specifications

- **Dimensions:** 100 x 72 mm (3.93 x 2.83 in)
- **Height:** 19 mm (.74 in)
- **Reference Weight:** 0.05 kg /.11 lb (0.25 kg/.55 lb with Heat Sink)

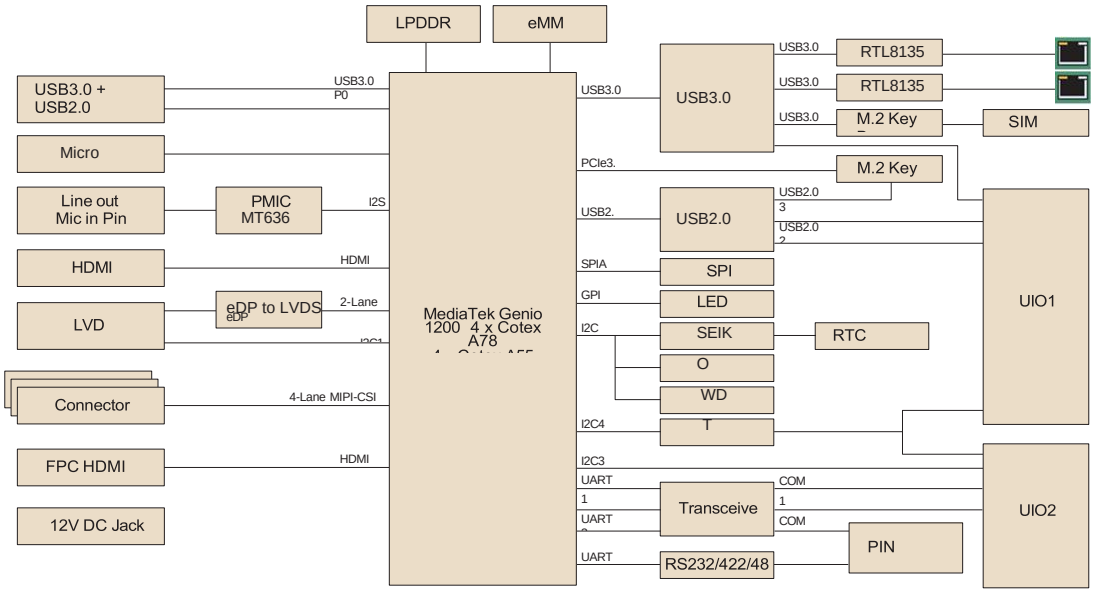
1.1.3 Electrical Specifications

- **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

1.2 Block Diagram



Chapter 2

Hardware Installation

This chapter details mechanical and connector information.

Sections include:

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

2.1 Jumper and Connector Locations

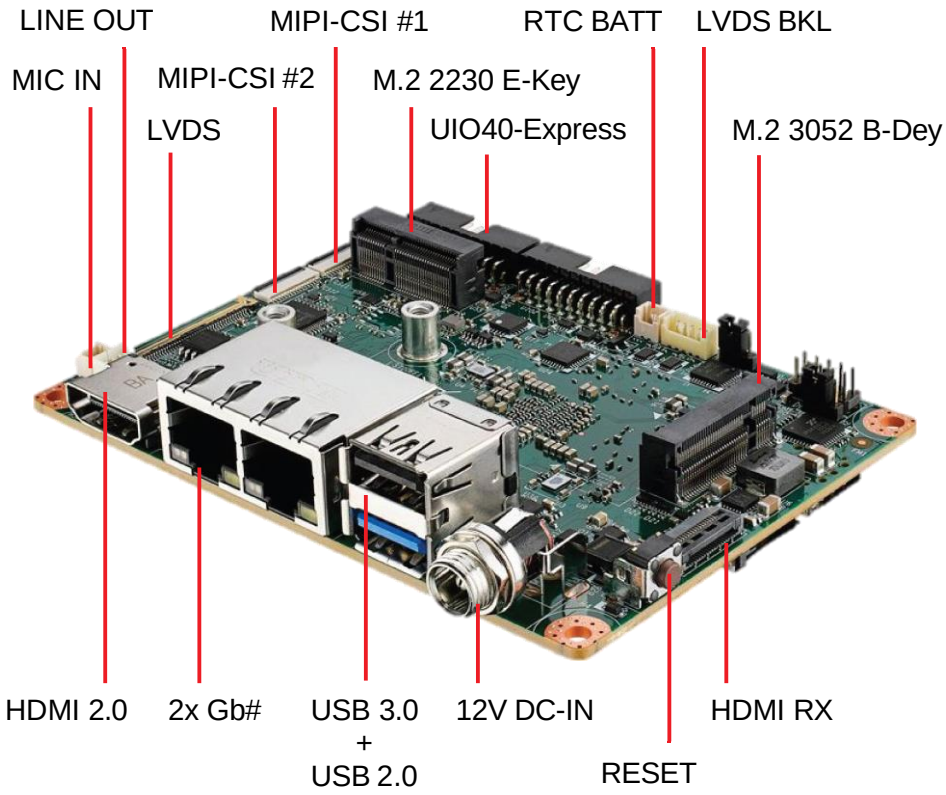


Figure 2.1

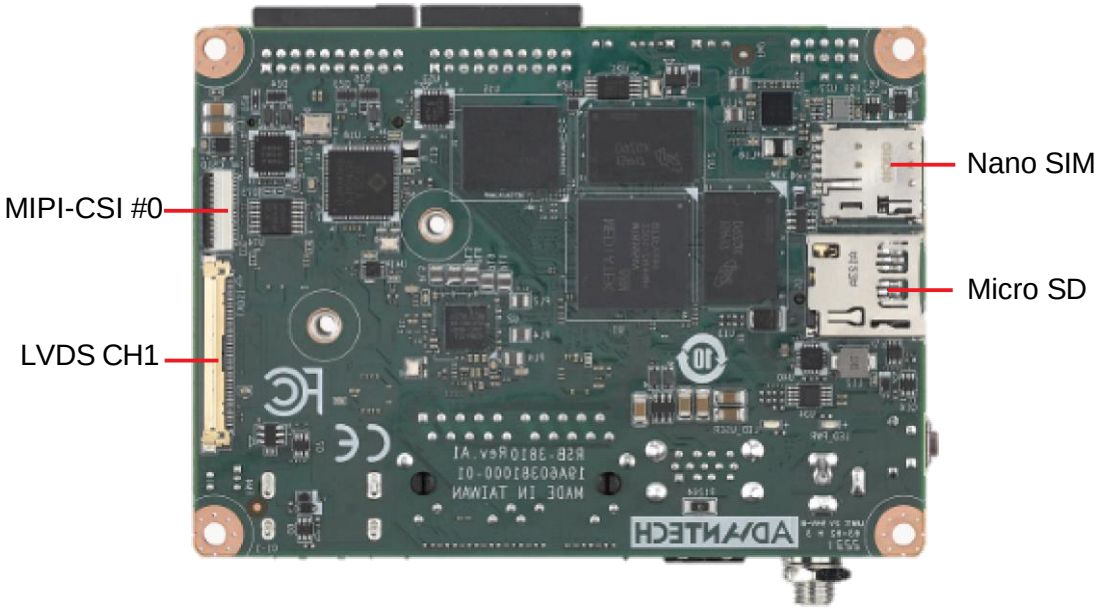


Figure 2.2

2.2 Board Dimensions

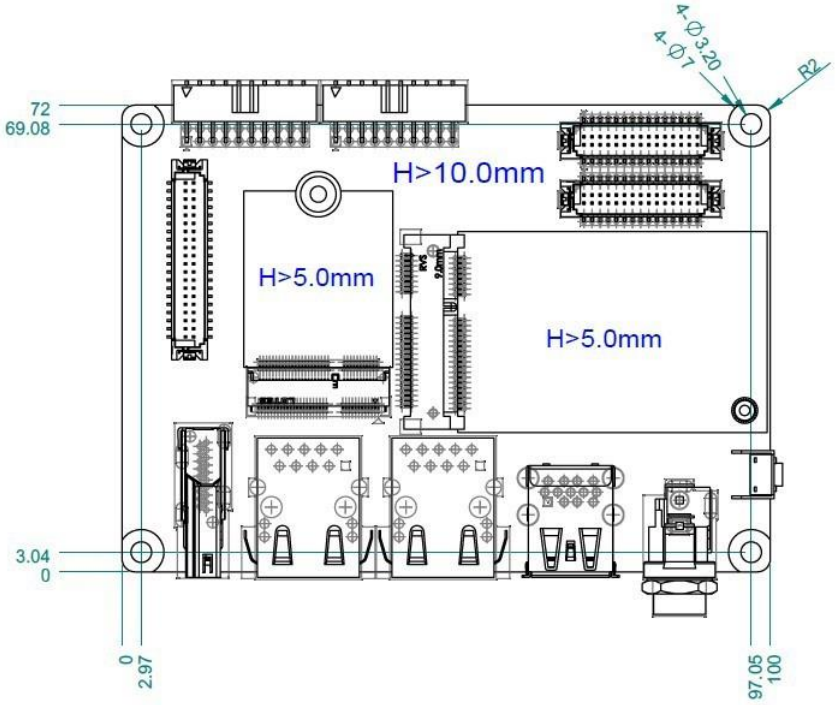
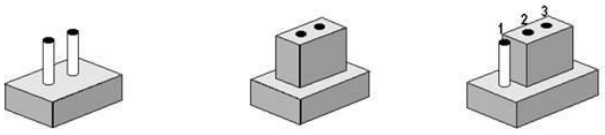


Figure 2.3

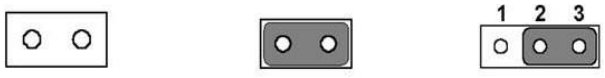
2.3 Jumpers

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	
BL0	Backlight Power Select for LVDS0 (Default 5V)
VDD0	LVDS VDD (Default 3.3V)

2.3.3 Jumper Settings

2.3.3.1 BLP0

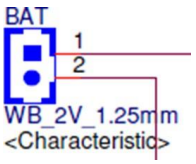


Table 2.2: BLP0	
BLP1	**Backlight Power Select for LVDS0**
Part Number	1653003101
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	**Function**
(1_2)	5V (Default)
(2_3)	12V

2.3.3.2 VDD0

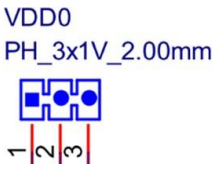


Table 2.3: VDD0	
BLP2	**Backlight Power Select for LVDS1**
Part Number	1653003101
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	**Function**
(1_2)	3V (Default)
(2_3)	5V

2.4 Connectors

2.4.1 Connector List

Table 2.4: Connectors

Name	Description
BAT	RTC Battery CONN.
BL0	LVDS Backlight
COM1	Debug Console + RS232/RS485
CSI0	MIPI-CSI Camera Input 0
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.
LAN	Ethernet 1 + Ethernet 2
LOUT	Line Out Pin Header
LVDS0	LVDS Channel 0 CONN.
LVDS1	LVDS Channel 1 CONN.
M2	M.2 Key E CONN.
MIC	MIC In Pin Header
M2B	M.2 Key B 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
DL_KEY	Download Key

2.4.2 Connector Settings

2.4.2.1 BAT (RTC Battery CONN.)

RSB-3810 supports one 2-pin type connector for the RTC Battery. The connector pins are defined below.

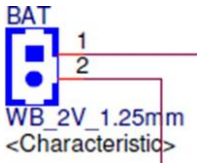


Table 2.5: BAT (RTC Battery CONN.)

Pin	Pin Name	Pin	Pin Name
1	+COIN_RTC	2	GND

2.4.2.2 BL0(LVDS Backlight 0)

RSB-3810 supports 1 LVDS Backlight CONN. for each channel. The pin definition for the 1st channel is demonstrated below:

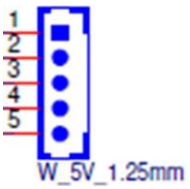


Table 2.6: BL1 (LVDS Backlight 1)

Pin	Pin Name	Pin	Pin Name
1	+12V	2	GND
3	LCD_BKLT_EN	4	LCD_BKLT_PWM
5	+5V	-	-

2.4.2.3 COM1

RSB-3810 supports 1 LVDS Backlight CONN. for each channel. The pin definition for the 2nd channel is demonstrated below:

Table 2.7: COM1 (Debug Console + RS232/RS485

Pin	Pin Name	Pin	Pin Name
1	COM2_DCD	2	COM0_RXD
3	COM2_RXD	4	COM2_RTS
5	COM2_TXD	6	COM2_CTS
7	COM2_DTR	8	COM0_TXD
9	GND	10	GND

2.4.2.4 CSI0 (MIPI-CSI Camera Input 0)

RSB-3810 supports 2 x 4-Lane MIPI-CSI Camera Input CONNs, CSI1 is for MIPI-CSI1. Their pin definitions are demonstrated below:

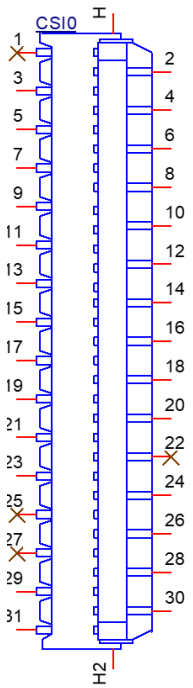


Table 2.8: CSI0 (MIPI-CSI Camera Input 0)

Pin	Pin Name	Pin	Pin Name
1	-	2	GND
3	CSI0D_L0N	4	CSI0B_L0P
5	GND	6	CSI0A_L2N
7	CSI0A_L2P	8	GND
9	CSI0A_L1N	10	CSI0A_L1P
11	GND	12	CSI0A_L0N
13	CSI0A_L0P	14	GND
15	CSI0B_L1N	16	CSI0B_L1P
17	GND	18	1ST_CAM_RESET
19	CMMCLK0	20	CSI1_RST#
21	I2C_CAM0_SDA	22	GND
23	I2C_CAM0_SCL	24	GND
25	-	26	GND
27	-	28	VCAMIO_PMU
29	VDD_CAM	30	GND
31	VDD_CAM		

2.4.2.5 CSI1 (MIPI-CSI Camera Input 1)

RSB-3810 supports 2 x 4-Lane MIPI-CSI Camera Input CONNs, CSI2 is for MIPI-CSI2. The pin definitions are demonstrated below:

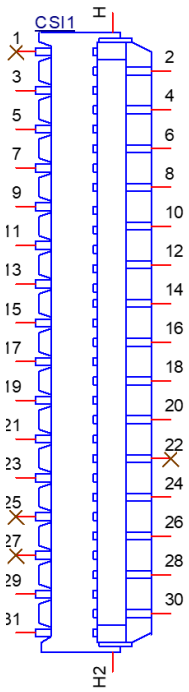
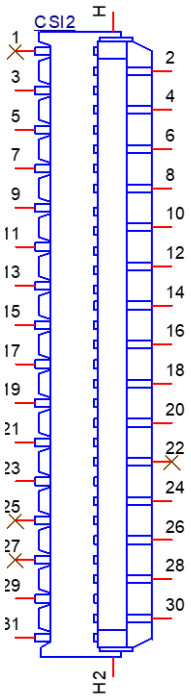


Table 2.9: CSI1 (MIPI-CSI Camera Input 1)

Pin	Pin Name	Pin	Pin Name
1	GND	2	GND
3	CSI0D_L0N	4	CSI0D_L0P
5	GND	6	CSI0C_L2N
7	CSI0C_L2P	8	GND
9	CSI0C_L1N	10	CSI0C_L1P
11	GND	12	CSI0C_L0N
13	CSI0C_L0P	14	GND
15	CSI0D_L1N	16	CSI0D_L1P
17	GND	18	2ND_CAM_RESET
19	CMMCLK1	20	GND
21	I2C_CAM1_SDA	22	-
23	I2C_CAM1_SCL	24	GND
25	-	26	GND
27	-	28	VCAMIO_PMU
29	VDD_CAM	30	GND
31	VDD_CAM	-	-

2.4.2.6 CSI1 (MIPI-CSI Camera Input 1)

RSB-3810 supports 2 x 4-Lane MIPI-CSI Camera Input CONNs, CSI2 is for MIPI-CSI2. The pin definitions are demonstrated below:



FPC_31H_S1.0mm
<Characteristic>

Table 2.10: CSI2 (MIPI-CSI Camera Input 2)

Pin	Pin Name	Pin	Pin Name
1	GND	2	GND
3	CSI1B_L0N_T0B	4	CSI1B_L0P_T0A
5	GND	6	CSI1A_L2N_T1C
7	CSI1A_L2P_T1B	8	GND
9	CSI1A_L1N_T1A	10	CSI1A_L1P_T0C
11	GND	12	CSI1A_L0N_T0B
13	CSI1A_L0P_T0A	14	GND
15	CSI1B_L1N_T1A	16	CSI1B_L1P_T0C
17	GND	18	3RD_CAM_RESET
19	CMMCLK2	20	GND
21	I2C1_SDA	22	-
23	I2C1_SCL	24	GND
25	-	26	GND
27	-	28	VCAMIO_PMU
29	VDD_CAM	30	GND
31	VDD_CAM	-	-

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

The power input for RSB-3810 is 12V. We designed the DC Jack and 2 x pin type Pin Header co-layout. The default SKU is a lockable DC Jack.

DCIN (Default):

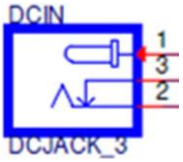


Table 2.11: DCIN (12V DC Jack)

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

DCIN1 (By BOM Option):

Table 2.12: DCIN1 (12V DC-IN Pin Header)

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

2.4.2.8 HDMI (HDMI CONN.)

RSB-3810 supports 1 x HDMI 2.0 CONN. along its coast line.

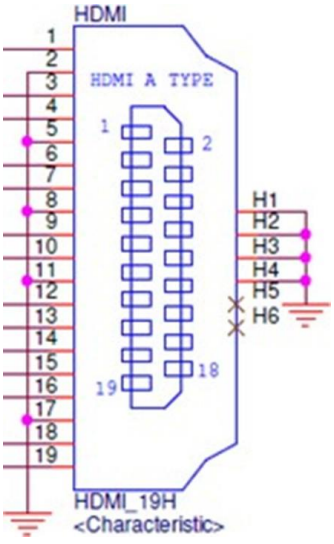


Table 2.13: HDMI (HDMI CONN.)			
Pin	**Pin Name**	**Pin**	**Pin Name**
1	HDMI_TD2+	2	GND
3	HDMI_TD2-	4	HDMI_TD1+
5	GND	6	HDMI_TD1-
7	HDMI_TD0+	8	GND
9	HDMI_TD0-	10	HDMI_CLK+
11	GND	12	HDMI_CLK-
13	HDMI_CEC	14	HDMI_Utility/ eARC+
15	HDMI_DDC_SCL	16	HDMI_DDC_SDA
17	GND	18	+5V
19	HDMI_HPD/ eARC-	-	-

2.4.2.9 LAN (Ethernet eth0+eth1)

LAN1 supports 10M/100M/1G.

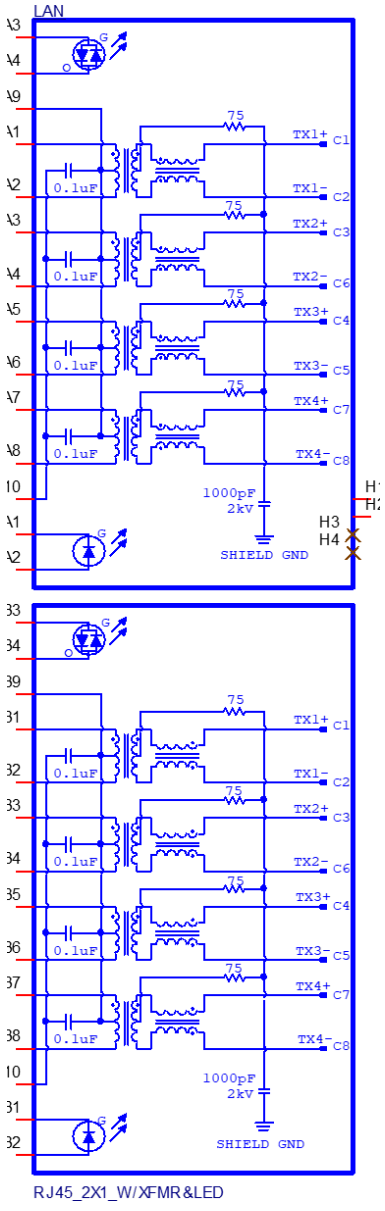


Table 2.14: LAN (Ethernet eth0+eth1)			
Pin	**Pin Name**	**Pin**	**Pin Name**
A1	GBE1_MDI0+	A2	GBE1_MDI0-
A3	GBE1_MDI1+	A4	GBE1_MDI1-
A5	GND	A6	GND
A7	GBE1_MDI2+	A8	GBE1_MDI2-
A9	GBE1_MDI3+	A10	GBE1_MDI3-
LA1	LAN1_ACT#	LA2	AVDD33_LAN1
LA3	LAN1_EEDO_1000#	LA4	LAN1_EESK_100#
B1	GBE_MDI0+	B2	GBE_MDI0-
B3	GBE_MDI1+	B4	GBE_MDI1-
B5	GND	B6	GND
B7	GBE_MDI2+	B8	GBE_MDI2-
B9	GBE_MDI3+	B10	GBE_MDI3-
LB1	LAN_ACT#	LB2	AVDD33_LAN1
LB3	LAN_EEDO_1000#	LB4	LAN_EESK_100#

2.4.2.10 LOUT (Line Out Pin Header)

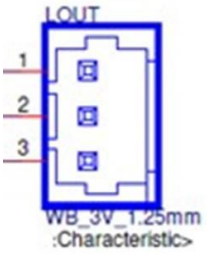


Table 2.15: LOUT (Line Out Pin Header)			
Pin	**Pin Name**	**Pin**	**Pin Name**
1	LINEOUT_L	2	LINEOUT_R
3	GND	-	-

2.4.2.11 LVDS0 (LVDS channel 0)

RSB-3810 supports one single channel LVDS @LVDS0, one 4-Lane MIPI-DSI @LVDS1, and can be configured as 1 dual channel LVDS.

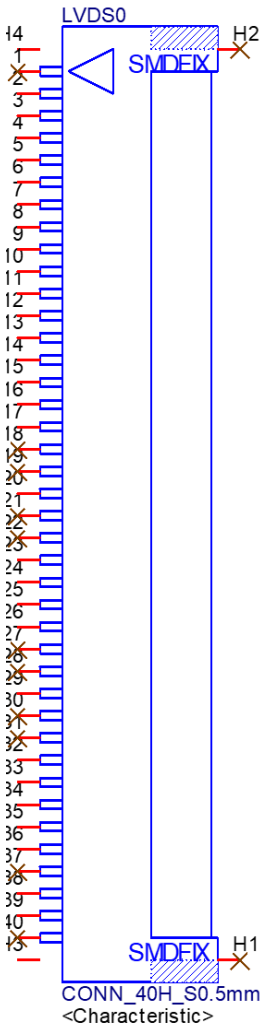


Table 2.16: LVDS0 (LVDS channel 0)

Pin	Pin Name	Pin	Pin Name
1	-	2	GND
3	LVDS0_D3-	4	LVDS0_D3+
5	GND	6	LVDS0_D2-
7	LVDS0_D2+	8	GND
9	LVDS0_D1-	10	LVDS0_D1+
11	GND	12	LVDS0_D0-
13	LVDS0_D0+	14	GND
15	LVDS0_CLK+	16	LVDS0_CLK-
17	GND	18	-
19	-	20	GND
21	-	22	-
23	GND	24	LVDS_DDC_SCL
25	LVDS_DDC_SDA	26	GND
27	-	28	-
29	GND	30	-
31	-	32	VDD_LVDS

Table 2.16: LVDS0 (LVDS channel 0)			
33	VDD_LVDS	34	VDD_LVDS
35	VDD_LVDS	36	GND
37	-	38	Pull-down 4.7K
39	LVDS_CTRL	40	-

2.4.2.12 LVDS1 (LVDS channel 1)

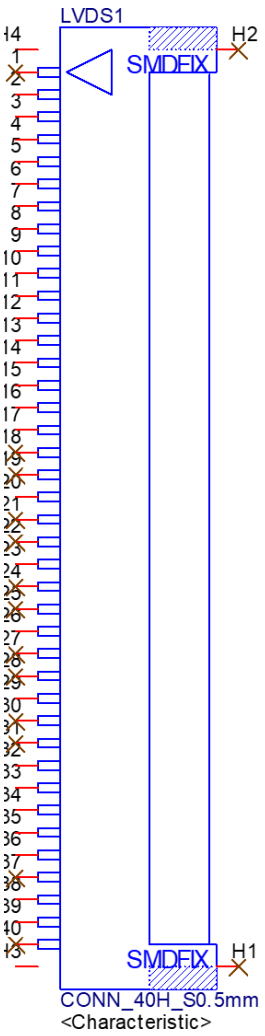


Table 2.17: LVDS1 (LVDS channel 1)			
Pin	**Pin Name**	**Pin**	**Pin Name**
1	-	2	GND
3	LVDS1_D3-	4	LVDS1_D3+
5	GND	6	LVDS1_D2-
7	LVDS1_D2+	8	GND
9	LVDS1_D1-	10	LVDS1_D1+
11	GND	12	LVDS1_D0-
13	LVDS1_D0+	14	GND
15	LVDS1_CLK+	16	LVDS1_CLK-
17	GND	18	-
19	-	20	GND
21	-	22	-
23	GND	24	LVDS_DDC_SCL

Table 2.17: LVDS1 (LVDS channel 1)			
25	LVDS_DDC_SDA	26	GND
27	-	28	-
29	GND	30	-
31	-	32	VDD_LVDS
33	VDD_LVDS	34	VDD_LVDS
35	VDD_LVDS	36	GND
37	-	38	Pull-down 4.7K
39	LVDS_CTRL	40	-

2.4.2.13 M2 (M.2 Key E CONN.)

RSB-3810 supports 1 x M.2 Key E CONN. for extension. It has the following interfaces: USB/PCIe/SDIO/UART/I2S.

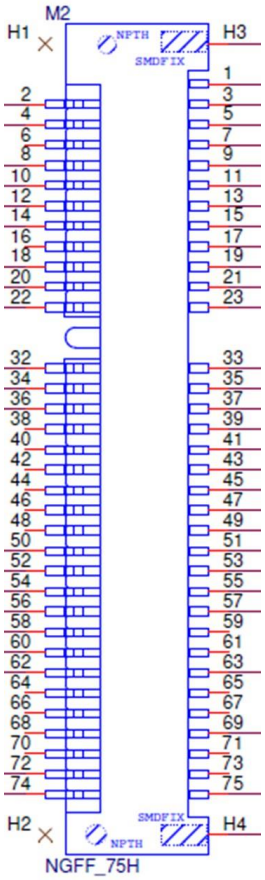


Table 2.18: M2 (M.2 Key E CONN.)			
Pin	**Pin Name**	**Pin**	**Pin Name**
1	GND	2	+3.3V
3	USB_M2E_DP	4	+3.3V
5	USB_M2E_DN	6	-
7	GND	8	-
9	-	10	-
11	-	12	-
13	-	14	-
15	-	16	-
17	-	18	GND

Table 2.18: M2 (M.2 Key E CONN.)			
19	-	20	-
21	-	22	-
23	-	-	-
		Key	
33	GND	32	-
35	PCIEG3_LN0_TXP	34	-
37	PCIEG3_LN0_TXN	36	-
39	GND	38	-
41	PCIEG3_LN0_RXP	40	-
43	PCIEG3_LN0_RXN	42	-
45	GND	44	-
47	PCIEG3_CLK_P	46	-
49	PCIEG3_CLK_N	48	-
51	GND	50	-
53	PCIE_CLKREQ_N	52	M2_RESET#_3V3
55	PCIE_WAKE_N	54	M2_W_DIS2#_3V3
57	GND	56	M2_W_DIS1#_3V3
59	-	58	-
61	-	60	-
63	GND	62	-
65	-	64	-
67	-	66	-
69	GND	68	-
71	-	70	-
73	-	72	+3.3V
75	GND	74	+3.3V

2.4.2.14 MIC (MIC In Pin Header)

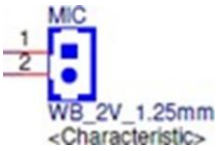


Table 2.19: MIC (MIC In Pin Header)			
Pin	**Description**	**Pin**	**Description**
1	MIC_IN	2	GND

2.4.2.15 M2B (M.2 KeyB CONN.)

RSB-3810 supports 1 x full size Mini-PCIe CONN. for extension via USB interface.

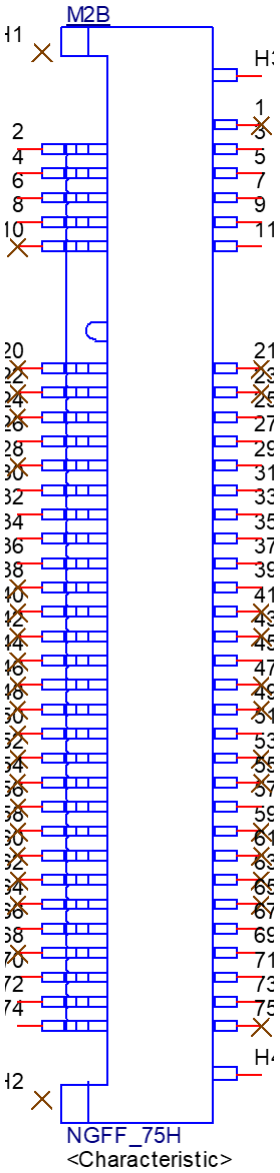


Table 2.20: M2B (M.2 keyB CONN.)

Pin	Pin Name	Pin	Pin Name
1	-	2	+3.8V
3	GND	4	+3.8V
5	GND	6	FCPO#
7	USB_HUB3_DP	8	W_DISABLE1#
9	USB_HUB3_DN	10	-
11	GND		
		Key	
		20	-
21	-	22	-
23	-	24	-
25	+1.8V	26	W_DISABLE2#
27	GND	28	-
29	USB_HUB3_SSRX_P	30	UIM_RESET

Table 2.20: M2B (M.2 keyB CONN.)			
31	USB_HUB3_SSTX_N	32	UIM_CLK
33	GND	34	UIM_DATA
35	USB_HUB3_SSTX_N	36	+VUIM_PWR
37	USB_HUB3_SSTX_P	38	-
39	GND	40	-
41	-	42	-
43	-	44	-
45	GND	46	-
47	-	48	-
49	-	50	-
51	GND	52	-
53	-	54	-
55	-	56	-
57	GND	58	-
59	-	60	-
61	-	62	-
63	-	64	-
65	-	66	SIM_DETECT
67	M2B_RESET#	68	
69	GND	70	+3.8V
71	GND	72	+3.8V
73	GND	74	+3.8V
75	-		

2.4.2.16 RST (Reset Button)

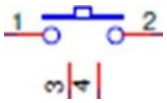


Table 2.21: RST (Reset Button)			
Pin	**Description**	**Pin**	**Description**
1	RESET_IN#	2	GND
3	GND	4	GND

2.4.2.17 SD (SD Slot)

RSB-3810 supports 1 x Micro SD Slot.

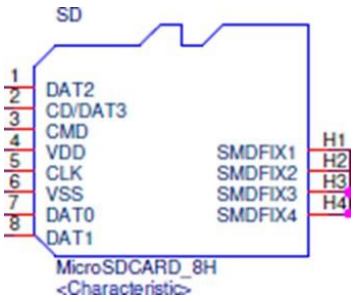


Table 2.22: SD (SD Slot)

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

2.4.2.18 SIM (SIM Slot)

RSB-3810 supports 1 x Nano SIM Slot.

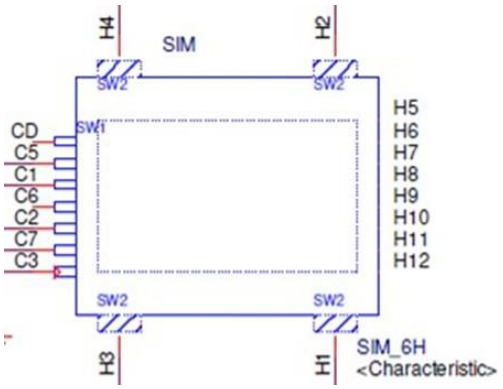


Table 2.23: SIM (SIM Slot)

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

2.4.2.19 UIO1 (UIO40-Express Pin Header 1)

RSB-3810 supports I/O extension via UIO40-Express standard. The UIO1 connector pinout is demonstrated below:

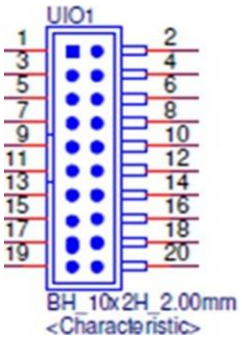


Table 2.24: UIO1 (UIO40-Express Pin Header 1)

Pin	Pin Name	Pin	Pin Name
1	5V_USB	2	GND
3	USB1_UIO_D-	4	USB2_UIO_D+
5	USB1_UIO_D+	6	USB2_UIO_D-
7	GND	8	5V_USB
9	USB_HUB2_SSTX-	10	UIO_GPIO2
11	USB_HUB2_SSTX+	12	UIO_GPIO4
13	5V_USB	14	GND
15	USB_HUB2_D-	16	USB_HUB2_SSRX+
17	USB_HUB2_D+	18	USB_HUB2_SSRX-
19	GND	20	5V_USB

2.4.2.20 UIO2 (UIO40-Express Pin Header 2)

RSB-3810 supports I/O extension via UIO40-Express standards. The UIO2 connector pinout is demonstrated below:

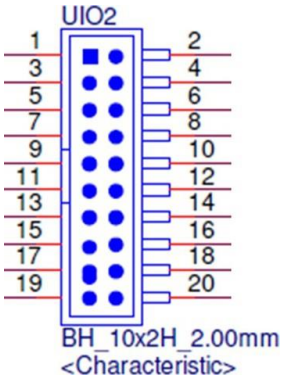


Table 2.25: UIO2 (UIO40-Express Pin Header 2)

Pin	Pin Name	Pin	Pin Name
1	5V	2	GND
3	COM3_TXD	4	COM1_TXD
5	COM3_RXD	6	COM1_RXD
7	UIO_GPIO5	8	UIO_GPIO6
9	UIO_GPIO7	10	UIO_GPIO8
11	UIO_GPIO9	12	UIO_GPIO10
13	UIO_GPIO11	14	UIO_GPIO12

Table 2.25: UIO2 (UIO40-Express Pin Header 2)			
15	-	16	I2C_UIO_SDA
17	-	18	I2C_UIO_SCL
19	3.3V	20	GND

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

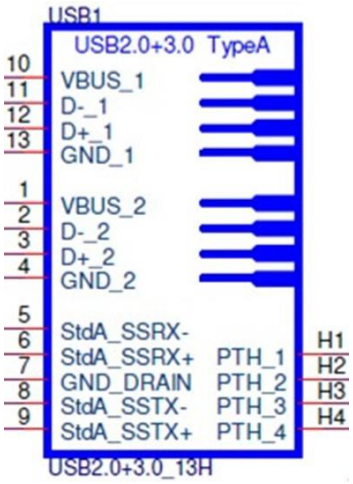


Table 2.26: USB 1 (USB 3.2 Gen 1 on TOP + USB 2.0 on BOT)			
Pin	**Pin Name**	**Pin**	**Pin Name**
1	VBUS_USB0	2	USB0_D-
3	USB0_D+	4	GND
5	SSUSB0_RXN	6	SSUSB0_RXP
7	GND	8	SSUSB0_TXP
9	SSUSB0_TXN	10	VBUS_USB0
11	USB3_D-	12	USB3_D+
13	GND	-	-
H1	GND	H2	GND
H3	GND	H4	GND

2.4.2.22 DL_KEY(Download Key)

Table 2.27: DL_KEY(Download Key)			
Pin	**Description**	**Pin**	**Description**
S1	KPCOL0	S2	GND
H1	-	H2	-
H3	-	H4	GND
H5	GND		

2.5 LED

Table 2.28: 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-3810 debug port is shared with COM1. Please connect the debug console cable 1700034345-01 & 1700019474. Then connect the USB-to-RS232 Cable to your PC terminal. Connect the cable to COM1 pin header to the nearby the HDMI connector.

Note: The debug cable needs to be purchased separately.

Table 2.29: Debug Port Connection		
Part Number	**Description**	**Picture**
1700034345-01	A Cable 2x5P-2.0/D-SUB 9P(M)x2 20cm	
1700019474	RS-232 Cable DB9 female to DB9 female	

2. RSB-3810 can communicate with a host server using serial cables. Common serial communication programs such as HyperTerminal, Tera Term or PuTTY can be used in such applications. The example demonstrated 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 2.23.

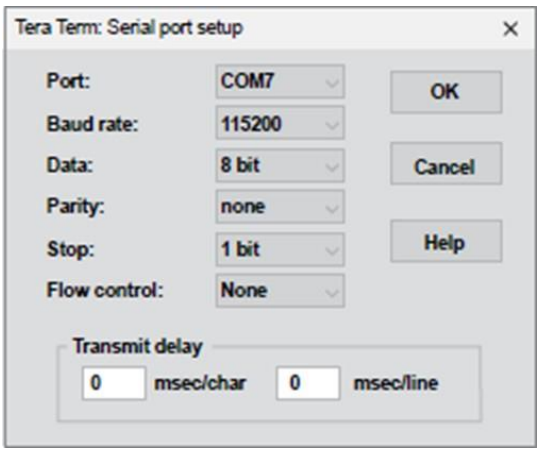


Figure 2.4

3. Connect a Display:

RSB-3810's default display interface is HDMI. When you use HDMI display as an example, please connect the HDMI display cable to RSB-3810's HDMI con- nector as shown in Figure 2.24.

Figure 2.5

4. Connect the Power Source:

RSB-3810's power input is 12VDC. The power interface's location is DCIN1. Please choose a 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 2.25.

Figure 2.6

5. When switching on the power, the green LED indicator (location LED_PWR) on BOT side of the board will light up to indicate that the board has booted up normally. (Figure 2.26)

Figure 2.7

6. After booting, the display boot screen is shown in Figure 2.27. The debug window is shown in Figure 2.28.

Figure 2.8

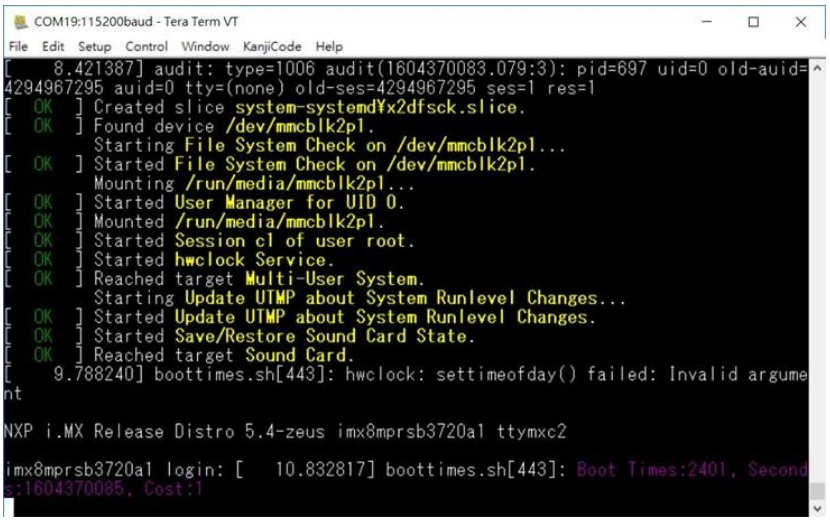

COM19:115200baud - Tera Term VT
File Edit Setup Control Window KanjiCode Help
[8.421387] audit: type=1006 audit(1604370083.079:3): pid=697 uid=0 old-auid=4294967295 auid=0 tty=(none) old-ses=4294967295 ses=1 res=1
[OK] Created slice system-systemd¥x2dfsck.slice.
[OK] Found device /dev/mmcblk2p1.
Starting File System Check on /dev/mmcblk2p1...
[OK] Started File System Check on /dev/mmcblk2p1.
Mounting /run/media/mmcblk2p1...
[OK] Started User Manager for UID 0.
[OK] Mounted /run/media/mmcblk2p1.
[OK] Started Session c1 of user root.
[OK] Started hwclock Service.
[OK] Reached target Multi-User System.
Starting Update UTMP about System Runlevel Changes...
[OK] Started Update UTMP about System Runlevel Changes.
[OK] Started Save/Restore Sound Card State.
[OK] Reached target Sound Card.
[9.788240] boottimes.sh[443]: hwclock: settimeofday() failed: Invalid argument
NXP i.MX Release Distro 5.4-zeus imx8mprsb3720a1 ttymxc2
imx8mprsb3720a1 login: [10.832817] boottimes.sh[443]: Boot Times:2401, Seconds:1604370085, Cost:1

Figure 2.9

Chapter 3

Software Functionality

This chapter details the software function on the RSB-3810.

3.1 Display

3.1.1 HDMI

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

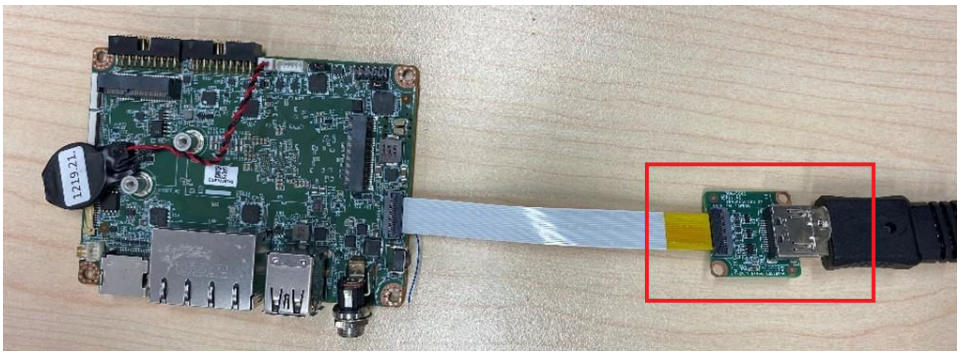
3.1.1.1 HDMI2.0 TX

Step 1: Setting-->Storage

Step 2: Play a video

3.1.1.2 HDMI2.0 RX

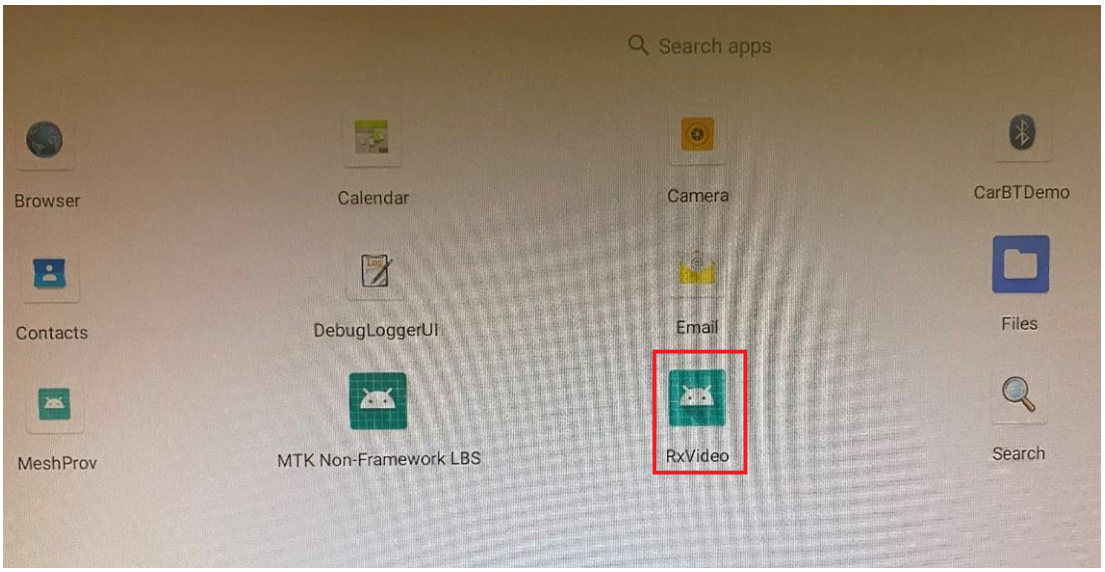
Step 1: Connect RX to PC



Step 2:

```
# setenforce 0
```

Step 3: Open RXVideo_2021_9_1.apk.



3.1.2 LVDS

3.1.2.1 Single Channel LVDS (Single LVDS0 or Single LVDS1

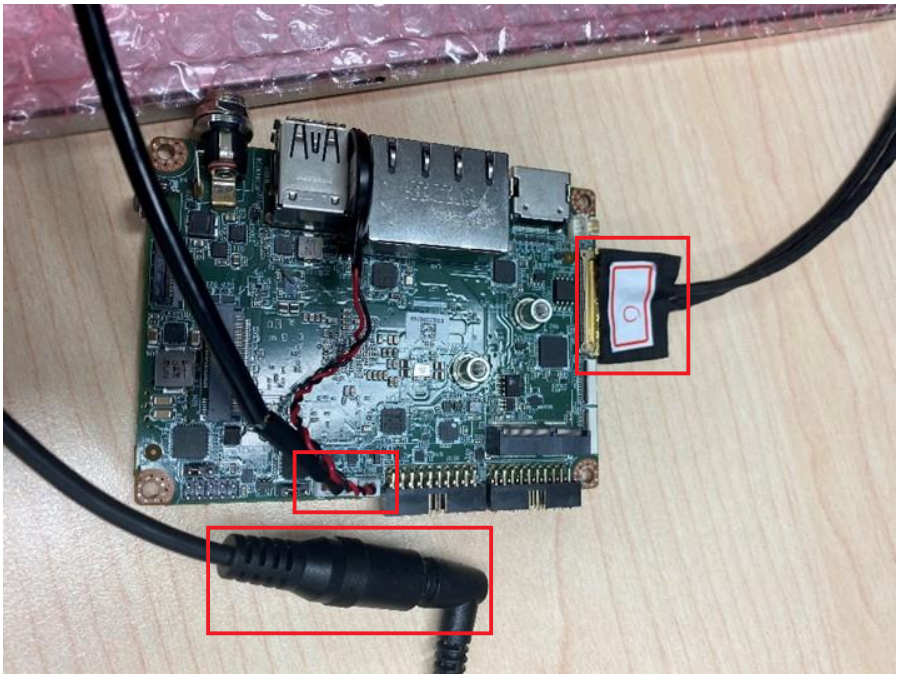
Dual Channel LVDS Panel: G215HVN0 (VDD: 5V, Backlight Power: 12V)

Step 1: Connect 96LEDK-A215FH30NF2 LVDS panel with the LVDS cable. Connect this to the LVDS. Connect the Backlight cable to BL1.

Step 2: Connect another 12V adapter to the DC-Jack on the backlight cable.

Step 3: Power on RSB-3810 and the extra 12V adapter.

Step 4: Press enter after boot. The system will stop at u-boot as demonstrated below, enter the command in red and press enter.



3.2 Audio

Step 1: Check audio codec

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

Step 2: Audio codec (sgtl5000):

1. Set MIC and headphone:

```
# amixer set Mic 100%
# amixer set Headphone 100%
```

2. Record and playback:

```
stop audioserver
# tinymix -D 1 'O040 I168 Switch' 1
# tinymix -D 1 'O041 I169 Switch' 1
# tinymix -D 1 'MISO0_MUX' UL1_CH1
# tinymix -D 1 'MISO1_MUX' UL1_CH1
# tinymix -D 1 'ADC_L_Mux' 'Left Preamplifier'
# tinymix -D 1 'PGA_L_Mux' 'AIN1'
# tinycap /data/tmp/rec.wav -D 1 -d 8 -r 48000 -c 2 -b 32 -T 2
# stop audioserver
# tinymix -D 1 'O176 I000 Switch' 1
# tinymix -D 1 'O177 I001 Switch' 1
# tinymix -D 1 'DAC In Mux' 'Normal Path'
# tinymix -D 1 'HP Mux' 'Audio Playback'
# tinyplay /data/tmp/rec.wav -D 1 -d 2 -p 1024 -n 2
# rm /data/tmp/rec.wav
```

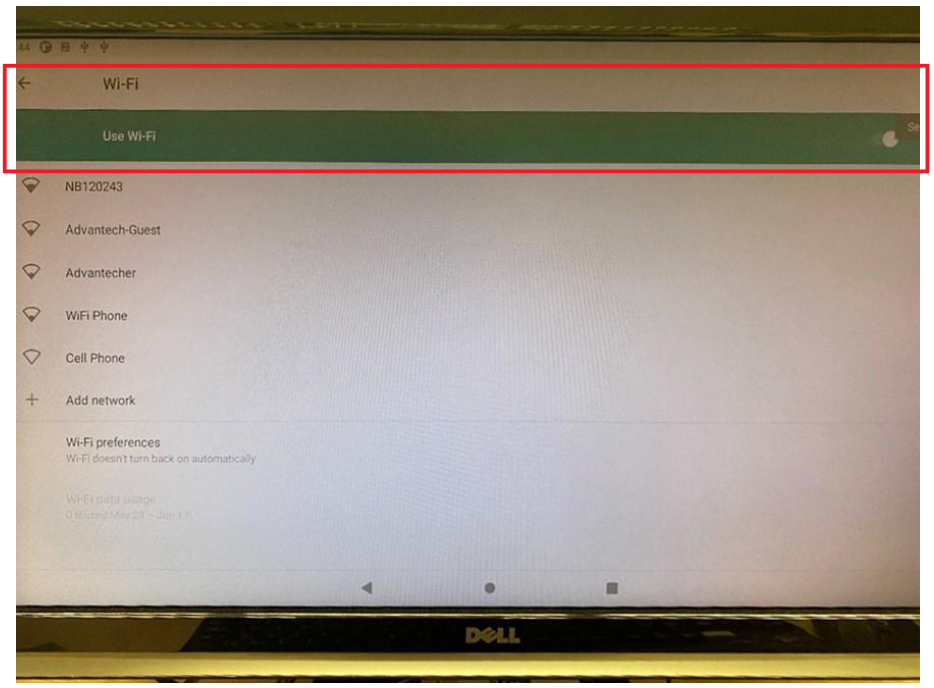
3.3 M.2

3.3.1 Test Wi-Fi with EWM-W174M201E Module (PCIe Interface)

Step 1: Open Android Setting.

Step 2: Click Network & internet.

Step 2: Search for WIFI.



3.3.2 Test Bluetooth with EWM-W174M201E Module (USB Interface)

Step 1: Open Android Setting.

Step 2: Click Connected devices.

Step 3: Click Connection preferences.

Step 4: Click Bluetooth.

Step 5: On and Pair new device

Step 6: Available devices

3.4 Serial Port

For COM1 serial port pin definition, please refer to previous chapter 2.4.2.4 for more information.

3.4.1 RS-232 Loopback Test (eg. ttyS3)

```
# stty -F /dev/ttyS3 speed 115200 ignbrk -brkint -icrnl -imaxbel -
opost -onlcr -isig -icanon -iexten -echo -echoe -echok -echoctl -
echoke
# cat /dev/ttyS3 &
# echo "Serial Test" > /dev/ttyS3
```

3.4.2 RS-422 Test

First change the debug console port to UART2 (UIO-4030COM_3), or use telnet to login to the system console to issue the command for the com port test.

Step 2: Set both

Adam-4520 RX- <-->RSB-3810 COM1 DB9 Pin 1,

Adam-4520 RX+ <-->RSB-3810 COM1 DB9 Pin 2,

Adam-4520 TX- <-->RSB-3810 COM1 DB9 Pin 4,

Adam-4520 TX+ <--> RSB-3810 COM1 DB9 Pin 3

```
# echo 328 > /sys/class/gpio/export
# echo 327 > /sys/class/gpio/export# echo out # out > /sys/class/
gpio/gpio328/direction
# echo out > /sys/class/gpio/gpio327/direction
# echo 0 > /sys/class/gpio/gpio328/value
# echo 1 > /sys/class/gpio/gpio327/value
```

Step 3: Test RS-422 with Adam-4520. Connect Adam-4520 with COM2 with 1700100250 DB9 as the following:

```
# stty -F /dev/ttyS2 speed 115200 ignbrk -brkint -icrnl -imaxbel -
opost -onlcr -isig -icanon -iexten -echo -echoe -echok -echoctl -
echoke
# cat /dev/ttyS2 &
# echo "Serial Test" > /dev/ttyS2
```

3.4.3 RS-485 Test

Step 1: Set GPIO#328, GPIO#327 Set to 0,1

Step 2: Test RS-485 with Adam-4520. Connect Adam-4520 with COM1 with 1700100250 DB9 as the following:

Adam-4520 Pin 1: Data- connect to DB9 Pin 1: COM_DCD. Adam-4520 Pin 2: Data+ connect to DB9 Pin 3: COM_RXD.

```
$ stty -F /dev/ttyS2 -echo -onlcr 921600 raw
$ cat /dev/ttyS2 &
$ echo "Serial Port Test" > /dev/ttyS2
or
$ microcom -s 921600 -X /dev/ttyS2
```

3.5 I²C

Step 1: Check i²c device

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

Step 2: I²c set and get

```
console:/ # i2cdetect -y -a 4
```

3.6 USB

USB disk test (USB 2.0/ USB 3.2 Gen 1 By 1 port)

Step 1: Issue the following command (lsusb -t) after inserting a USB disk into the USB 2.0 port or USB 3.2 Gen 1 port to check if the USB device is listed.

```
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
```

Step 2: 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
```

3.7 RTC

Step 1: Set system time to current, then write to RTC

```
console:/ # date 113009362023 && hwclock -w && date
```

Step 2: Set one incorrect time, then read time from RTC to verify

```
console:/ # date 113009362023 && hwclock -r
```

Step 3: Restore the RTC time to system time

```
console:/ # date 113009362023 && hwclock -r
```

3.8 eMMC/SD/SPI flash

3.8.1 Device Routes

eMMC: /dev/mmcblk2

SD: /dev/ mmcblk1p1

3.8.1.1 Test (eg. emmc)

Step 1: Open Android Setting.

Step 2: Click Storage

3.9 Ethernet

Step 1: Check the 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
```

Step 2: Connect the 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:~#
```

3.10 GPIO

3.10.1 GPIO Pins

Table 3.1: UIO Extension 1 (UIO1)	
Pin	**Numbers**
GPIO2	315
GPIO4	316

Table 3.2: UIO Extension 2 (UIO2)	
Pin	**Numbers**
GPIO5	317
GPIO6	318
GPIO7	319
GPIO8	320
GPIO9	321
GPIO10	322
GPIO11	323 or 408
GPIO12	324 or 409

3.10.2 GPIO Loopback Test (Using GPIO2 and GPIO4 as examples)

Step 1: Connect GPIO2 and GPIO4

Step 2: Export GPIO interface

```
# echo 315 > /sys/class/gpio/export
# echo 316 > /sys/class/gpio/export
```

Step 3: Set GPIO direction

```
# echo out > /sys/class/gpio/gpio1/direction
# echo in > /sys/class/gpio/gpio2/direction
```

Step 4: Read value and set output value than check

```
# cat /sys/class/gpio/gpio2/value 0
# echo 1 > /sys/class/gpio/gpio1/value
# cat /sys/class/gpio/gpio2/value
1
```

3.11 Watchdog

3.11.1 Internal Watchdog

Step 1: System will reboot after 60 sec. androidboot.bootreason=HW_reboot

```
# stop watchdogd
```

Step 2: System will reboot after 60 sec. androidboot.bootreason=HW_reboot

```
# stop watchdogd && echo 1 > /dev/watchdog
```

Step 3: System will reboot after 3 sec. androidboot.bootreason=reboot

```
# reboot
```

Step 4: System will reboot after 1 sec. androidboot.bootreason=kernel_panic

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

3.11.2 External Watchdog

Step 1: System will reboot after 60 sec. androidboot.bootreason=usb

```
# echo 1 > /dev/watchdog1
```

Step 2: System will not reboot. Watchdog can be refreshed when feed dog before it timeout.

Step 3: System will reboot after 10 sec ==> Watchdog does not refresh after it time-out.

```
# ext_wdt_driver_test 10 1 0
```

androidboot.bootreason=usb

```
# ext_wdt_driver_test 10 1 0 && Ctrl + C
```

3.12 Camera (Default MIPI-CSI0 and MIPI-CSI1 are for OV5640)

3.12.1 MIPI-CSI0 (Tested with OV5640 + mini-SAS to MIPI-CSI Cable)

Step 1: Use Android camera app to test

Step 2: Take pictures

Step 3: Video recording

Step 4: Check photo

3.12.2 MIPI-CSI1 (Tested with OV5640 + mini-SAS to MIPI-CSI Cable)

Step 1: Use Android camera app to test

Step 2: Take pictures

Step 3: Video recording

Step 4: Check photo

3.12.3 MIPI-CSI2 (Tested with OV5640 + mini-SAS to MIPI-CSI Cable)

Step 1Remove the CSI-0 and CSI-1 camera first

Step 2: Use Android camera app to test

Step 3: Take pictures

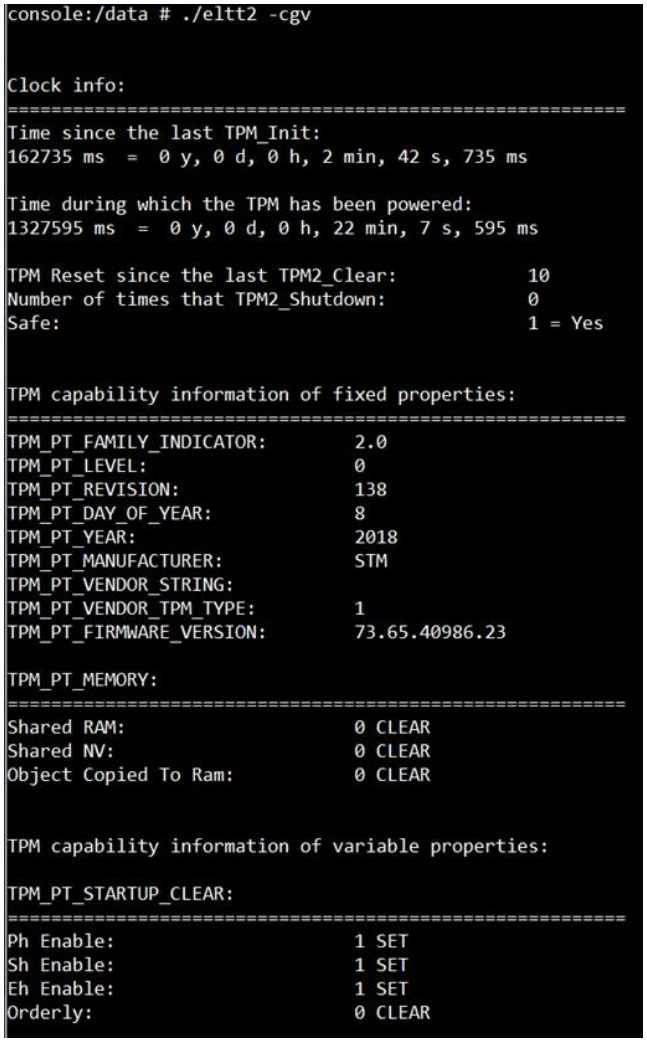
Step 4: Video recording

Step 5: Check photo

3.13 TPM

Please use tpm_test.bin to test.

```
# eltt2 -cgv
```



3.14 LED

3.14.1 LED ON/OFF test

```
LED Status: Detect gpio signal
LED ON: echo 255 >
/sys/class/leds/user/brightness
LED OFF: echo 0 >
/sys/class/leds/user/brightness
```

3.15 UIO Extension Boards

3.15.1 UIO-4030

Table 3.3: UIO-4030		
1	UART	UART# stty -F /dev/ttyS3 -echo -onlcr 921600 raw # cat /dev/ttyS3 & # echo "Serial Port Test" > /dev/ttyS3 or #microcom -s 921600 -X /dev/ttyS3
2	GPIO	4 DI & 4 DO Pins (UIO Extension_UIO2) input pin#5: gpio 317 output pin#6: gpio 318 input pin#7: gpio 319 output pin#8: gpio 320 input pin#9: gpio 321 output pin#10: gpio 322 input pin#11: gpio 323 or408 output pin#12: gpio 324 or 409
3	RS-485	1. Test RS-485 with Adam-4520. Adam-4520 Pin Data- and Pin Data+ connect to UIO-4030 COM_4 Pin 1 and Pin 2. # stty -F /dev/ttyUSB0 speed 115200 ignbrk -brkint -icrnl - imaxbel -opost -onlcr -isig -icanon -iexten -echo -echoe -echok -echoctl -echoke # cat /dev/ttyUSB0 & # echo "Serial Test" > /dev/ttyUSB0
4	EEPROM	# echo -n $'\x06\x05\x04\x03\x02\x01' > /data/test1 # dd if=/data/test1 of=/sys/bus/i2c/devices/3-0050/eeprom # dd if=/sys/bus/i2c/devices/3-0050/eeprom of=/data/test2 conv=fsync

3.15.2 UIO-4032

Table 3.4: UIO-4032		
1	UART	# stty -F /dev/ttyS3 -echo -onlcr 921600 raw # cat /dev/ttyS3 & # echo "Serial Port Test" > /dev/ttyS3 or # microcom -s 921600 -X /dev/ttyS3 # cat /dev/ttyS3 & --- # stty -F /dev/ttyS1 -echo -onlcr 921600 raw # cat /dev/ttyS1 & # echo "Serial Port Test" > /dev/ttyS1 or # microcom -s 921600 -X /dev/ttyS1
2	USB	USB disk write/read/verify pattern
3	Ethernet	# ifconfig # ping 8.8.8.8
4	EEPROM	# echo -n $'\x06\x05\x04\x03\x02\x01' > /data/test1 # dd if=/data/test1 of=/sys/bus/i2c/devices/3-0050/eeprom # dd if=/sys/bus/i2c/devices/3-0050/eeprom of=/data/test2 conv=fsync

3.15.3 UIO-4034

Table 3.5: UIO-4034		

1	UART	$ stty -F /dev/ttyS3 -echo -onlcr 921600 raw
		$ cat /dev/ttyS3 &
		$ echo "Serial Port Test" > /dev/ttyS3
		or
		$ microcom -s 921600 -X /dev/ttyS3

		$ stty -F /dev/ttyS1 -echo -onlcr 921600 raw
		$ cat /dev/ttyS1 &
		$ echo "Serial Port Test" > /dev/ttyS1
		or
		$ microcom -s 921600 -X /dev/ttyS1

2	CAN Bus	
3	EEPROM	# echo -n $'\x06\x05\x04\x03\x02\x01' > /data/test1 # dd if=/data/test1 of=/sys/bus/i2c/devices/3-0050/eeprom # dd if=/sys/bus/i2c/devices/3-0050/eeprom of=/data/test2 conv=fsync

3.15.4 UIO-4036

Table 3.6: UIO-4036		
1	Lan Switch	#ifconfig #ping 8.8.8.8
2	USB	USB disk write/read/verify pattern
3	EEPROM	# echo -n $'\x06\x05\x04\x03\x02\x01' > /data/test1 # dd if=/data/test1 of=/sys/bus/i2c/devices/3-0050/eeprom # dd if=/sys/bus/i2c/devices/3-0050/eeprom of=/data/test2 conv=fsync

3.15.5 UIO-4038

Table 3.7: UIO-4038		
1	LAN3	# ping 192.168.100.1
2	USB	USB disk write/read/verify pattern
3	EEPROM	# echo -n $'\x06\x05\x04\x03\x02\x01' > /data/test1 # dd if=/data/test1 of=/sys/bus/i2c/devices/3-0050/eeprom # dd if=/sys/bus/i2c/devices/3-0050/eeprom of=/data/test2 conv=fsync

3.15.6 UIO-4040

Table 3.8: UIO-4040		
1	SSD	# SSD disk write/read/verify pattern
2	EEPROM	# echo -n $'\x06\x05\x04\x03\x02\x01' > /data/test1 # dd if=/data/test1 of=/sys/bus/i2c/devices/3-0050/eeprom # dd if=/sys/bus/i2c/devices/3-0050/eeprom of=/data/test2 conv=fsync

3.16 PyeIQ Test

The i.MX 8M Plus family focuses on neural processing units (NPU) and vision system as well as advance multimedia, delivering highly reliable industrial automation.

The Neural Processing Unit (NPU) operating at up to 2.3 TOPS

- Keyword detection, noise reduction, and beamforming
- Speech recognition (i.e. Deep Speech 2)
- Image recognition (i.e. ResNet-50)

eIQ - A Python Framework for eIQ on i.MX Processors

PyeIQ is written on top of eIQ™ ML Software Development Environment and provides a set of Python classes allowing the user to run Machine Learning applications in a simplified and efficient way without spending time on cross-compilations, deployments, or reading extensive guides.

For more examples and how to run PyeIQ demos on RSB-3810, please refer to the below page:

http://ess-wiki.advantech.com.tw/view/AIMLinux/AddOn/Edge_AI

3.16.1 Run Applications and Demos

3.16.1.1 Applications

Table 3.9: Applications

Application Name	Framework	i.MX Board	BSP Release	Inference Core	Status
Switch Classification Image	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	CPU, GPU, NPU	PASS
Switch Detection Video	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	CPU, GPU, NPU	PASS

3.16.1.2 Demos

Table 3.10: Demos

Demo Name	Framework	i.MX Board	BSP Release	Inference Core	Status
Object Classification	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Object Detection SSD	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Object Detection YOLOv3	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Object Detection DNN	OpenCV:4.2.0	RSB-3810	5.4.24_2.1.0	CPU	PASS
Facial Expression Detection	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Fire Classification	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Fire Classification	ArmNN:19.08	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Pose Detection	TFLite:2.1.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS
Face/Eyes Detection	OpenCV:4.2.0	RSB-3810	5.4.24_2.1.0	GPU, NPU	PASS

Chapter 4

System Recovery

This chapter details system recovery for a damaged Linux OS.

4.1 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.

4.1.1 Recovery by SD Card

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

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

4. Insert the SD card and copy the 3720A1AIM30LIVA0070_iMX8MP_flash_tool to a USB disk.
5. Insert the USB disk and SD card then boot the whole system from the SD card by changing SW1 to 1-2 ON, 3-4 OFF.
6. Enter USB disk folder and make a bootable emmc.

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

Chapter 5

Advantech Services

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

5.1 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 engineers with a schematic checklist and review services based on customer carrier board specifications. These services prevent design errors before they occur. This saves time and reduces the costs associated with developing carrier boards.

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

Thermal Solution Services

Advantech provides thermal solution services — including modularized and/or customized thermal solutions — that quickly accommodate customers' designs.

- Standard thermal solutions
- Customized thermal solutions

Embedded Software Services

This service provides support drivers, software integration/customized firmware, root file-system, and Linux image — enabling users to save time and focus on their core development.

- Embedded Linux/ Android OS
- Advantech boot loader Customization

With the spread of industrial computing, a whole range of new applications has been developed, resulting in a fundamental change in the IPC industry. Due to diverse market demands and intense competition, cooperation on vertical integration is an effective way to create competitive advantages. As a result, ARM-based CPU modules have grown in popularity. Concentrating all necessary components on CPU modules and placing other parts on the carrier board provides greater flexibility while retaining low power consumption credentials.

Advantech has identified the following common questions concerning the implementation of modular designs.

General I/O Design Capability

Users can typically perform vertical integration. However, lack of expertise and experience in general power and I/O design can cause challenges; especially when integrating CPU modules into carrier boards.

Data Acquisition

Despite obtaining sufficient information for making decisions concerning specialized vertical applications, some customers encounter difficulties dealing with platform design, and communicating with the CPU/chipset manufacturers. These challenges in carrier board design can negatively impact time-to-market at the expense of market opportunities.

Software Development and Modification

Compared to x86 architectures, RISC architectures use simpler instruction sets. Software support for x86 platforms cannot be used on RISC platforms. System integrators (SI) need to develop software for their system and integrate it with hardware themselves. Unlike x86 platforms, RISC platforms are not well supported by Board Support Packages (BSP) and drivers. While driver support is provided, system integration still requires a lot of effort. The BSP provided by CPU manufacturers is usually tailored for carrier board design, making system integration for software difficult.

Addressing this, Advantech introduced Streamlined Design-in Support Services for RISC-based Computer on Modules (COM). With a dedicated professional design-in services team, Advantech actively participates in carrier board design and problem solving. Advantech's services not only enable customers to effectively distribute their resources, but also reduce R&D costs and hardware investment.

By virtue of a cooperative relationship with leading original manufacturers of CPUs and chipsets — such as ARM, TI, and NXP — Advantech helps solve communication and technical support difficulties. This can reduce the uncertainties in product devel-

opment. Advantech's professional software team focuses on providing complete Board Support Packages. They also help customers create a software development environment for their RISC platforms.

Advantech RISC design-in services helps customers reduce time to market by overcoming their problems through streamlined services.

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

Planning Stage

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process, detailing product features, specifications, and compatibility testing with software. Advantech offers a RISC Customer Solution Board (CSB) as an evaluation tool for carrier boards which are simultaneously designed when developing RISC COMs. In the planning stage, customers can use this evaluation board to assess RISC modules and test peripheral hardware. Advantech provides standard software Board Support Packages (BSP) for RISC COM, so that customers can define their product's specifications while simultaneously verifying I/O and performance. Advantech also offers software evaluation and peripheral module recommendations (such as Wi-Fi, 3G, and BT). At this stage, Advantech seeks to resolve customer concerns. Product evaluation with a focus on performance and specification is vital during the planning period. Therefore, Advantech helps their customers conduct all the necessary tests for their RISC COM.

Design Stage

Advantech will supply a reference carrier board design guide when a product moves into the design stage. The carrier board design guide provides pin definitions for the COM connectors with limitations and recommendations for carrier board design. This design guide gives customers clear guidelines during their carrier board development. Advantech offers a complete pin-out check list for different form factors such as Q7, ULP and RTX 2.0, enabling carrier board signals and layout design examination. Advantech's team helps customers review the placement/layout and schematics. This helps carrier board designs fulfill customers' requirements. Advantech's RISC software team assists in establishing an environment for software development while evaluating the time and resources needed. Advantech can also cooperate with third parties to provide proficient consulting services in software development. With Advantech's professional support, the design process is eased and product quality is improved; thus meeting customer targets.

Integration Stage

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

Validation Stage

After the completion of a customer's ES sample there is a series of verification steps. In addition to verifying a product's functionality, testing a product's efficiency is an important stage for RISC platforms. Through an efficient verification process, backed by Advantech's technical support, customers optimize their applications with ease. Advantech's team can provide professional consulting services

5.2 Contact Information

Below is the contact information for Advantech customer service.

Table 6.1: 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.

5.3 Global Service Policy

5.3.1 Warranty Policy

The warranty policy for Advantech products is provided below.

5.3.1.1 Warranty Period

Advantech branded off-the-shelf products and third-party off-the-shelf products used to assemble Advantech's Configure-to-Order products are entitled to a two-year 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.

5.3.1.2 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.

5.3.1.3 Exclusions from Warranty

The product is excluded from warranty if the product has been found to be defective after expiry of the warranty period. Warranty has been voided by removal or alternation of 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 deter- mined 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.

5.3.2 Repair Process

5.3.2.1 Obtaining an RMA Number

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

An RMA number is only an authorization for returning a product; it is not an approval for repair or replacement. 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.

5.3.2.2 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.

5.3.2.3 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 light- ing strike, flood, earthquake, etc.

The product is sent for updates, upgrades, or tests at the request of the cus- tomer 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.

5.3.2.4 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.

5.3.2.5 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.

5.3.2.6 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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