



User Manual

ROM-5720

**Arm-Based SMARC 2.0 Module
with NXP i.MX8M Arm® Cortex®
A53 Processor**

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Product Warranty (2 years)

Advantech warrants to you, 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 which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which 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 of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

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 you get 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 an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class B

Note: 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 help

Ordering Information

Part No.	Description
ROM-5720CD-PEA1E	ROM-5720 SMARC2.0 NXP i.MX8M Dual Core 1.5GHz 0~60°C
ROM-5720CQ-PEA1E	ROM-5720 SMARC2.0 NXP i.MX8M Quad Core 1.5GHz 0~60°C
ROM-5720WD-OEA1E	ROM-5720 SMARC2.0 NXP i.MX8M Dual Core 1.3GHz -40~85°C
ROM-5720WQ-OEA1E	ROM-5720 SMARC2.0 NXP i.MX8M Quad Core 1.3GHz -40~85°C
ROM-DB5901-SWA1	Development carrier board for SMARC 2.0 module

Packing List

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

- 1 x ROM-5720
- 4 x Screws
- 1 x China ROHS

Optional Accessories

Part No.	Description
96PSA-A36W12R1	ADAPTER 100-240V 36W 12V 3A
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
1700019076	USB OTG to Type A Female
1700019077	USB OTG to Type A Male
1701100300	D-SUB 9P(M) 30cm for COM Port
9696MEG510E	Audio Daughter Board
9680015491	PCIe to Mini PCIe Adapter Card
ROM-EG56	MIPI-DSI to HDMI Board
SQF-ISDM1-16G-21C	SQ Flash SD Card UHS-I MLC 16G (0~70°C)
SQF-ISDM1-16G-21E	SQ Flash SD Card UHS-I MLC 16G (-40~85°C)
EWM-W163M201E	802.11a/b/g/n/ac,QCA6174A-5,2T2R,with BT4.2,full size Mini PCIe
1750008717-01	WiFi Dual Band Antenna (2.4Ghz and 5Ghz)
1750007965-01	Antenna Cable , SMA (M) to MHF4, 300mm
EWM-C117FL06E	LTE/HSPA+/GPRS Module, w/ SIM Slot, TOBY-L280H, for Taiwan
1750007990-01	Antenna 4G/LTE Full Band L=11 cm 50 Ohm
1750006009	Antenna Cable SMA (F) to MHF 1.32 25cm
1970004440T001	Heat Spreader
1960063089N001	Semi Heat Sink
1930004835	Screw for Heat Spreader and Semi Heat Sink

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.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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Chapter 1

General Introduction

This chapter briefly introduces the ROM-5720 platform

Sections include:

- Introduction
- Specifications

1.1 Introduction

ROM-5720 SMARC2.0 Module integrates the NXP i.MX8M Arm Cortex-A53 high performance processor that supports a Vivante GC7000 Lite 3D Graphics engine and 4Kp60 HEVC decoding with HDR.

ROM-5720 comes with Advantech ROM-DB5901 Evaluation Carrier Board for easy integration and design reference; we also offer referenced schematics and layout checklists for carrier board development. Additionally, Linux BSP, test utilities, HW design utilities and reference codes are ready for application development and device integration.

ROM-5720 is suitable for following applications:

- Computing Vision
- Medical
- Robotic
- Infotainment
- Portable Devices

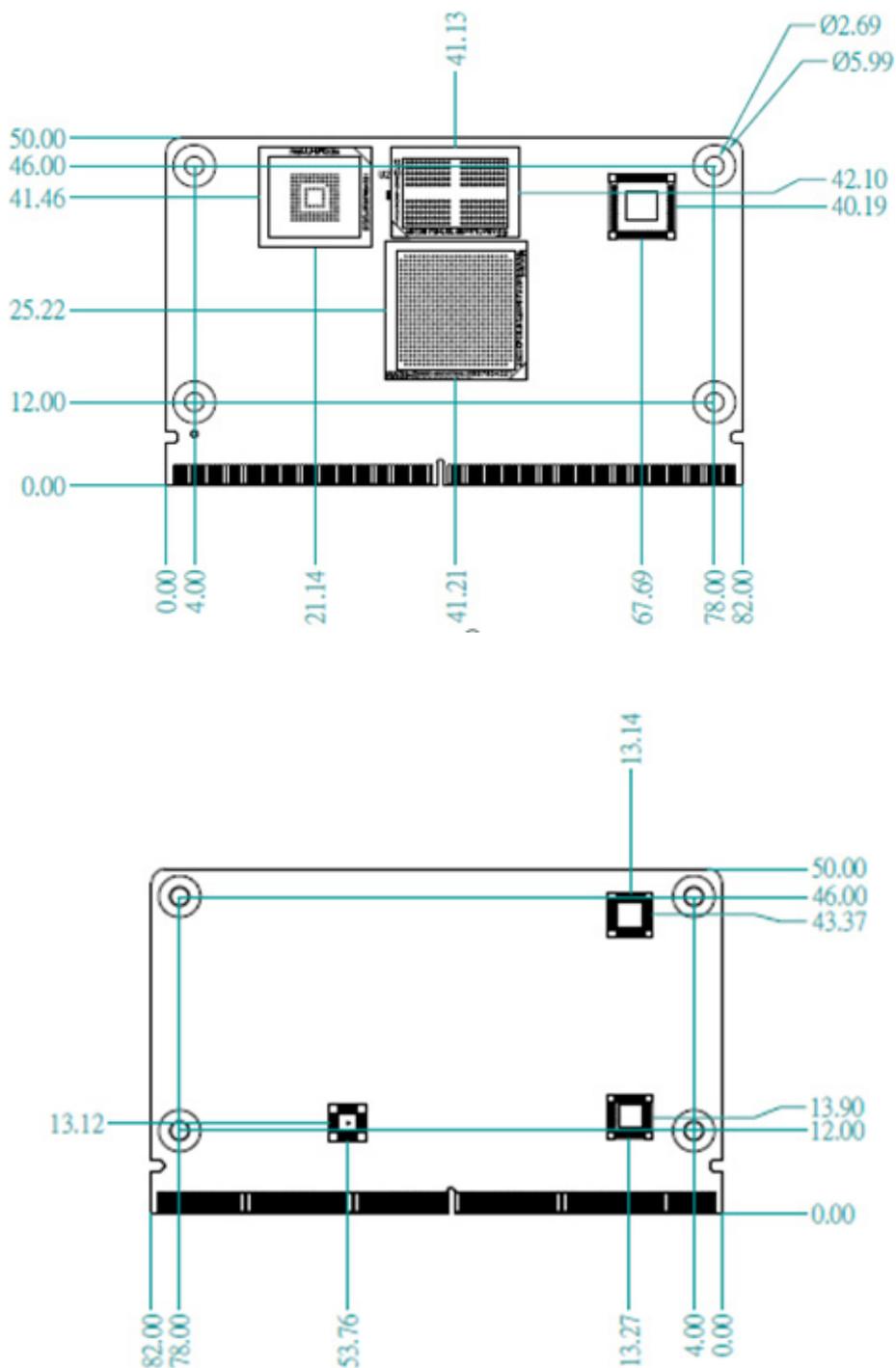
1.2 Product Features

Compatible Module		SMARC 2.0
Processor System	CPU	NXP Arm Cortex-A53 i.MX8M Dual/Quad, up to 1.5GHz
Memory	Technology	LPDDR4 1866 MHz
	Capacity	On-board 2 GB
	Flash	16 GB eMMC for O.S. and 8 MB NOR Flash
Graphic	H/W Video Decode	HEVC/H.265(4Kp60), VP9(4Kp60), H.264(4Kp30), MPEG-2, MPEG-4p2, VC-1, VP8, RV9, AVS, MJPEG, H.263
	HDMI	4096 x 2160 at 60 Hz
	MIPI-DSI	1 x 4-lane MIPI DSI, up to 1920 x 1080 @ 60Hz
Camera Input	MIPI-CSI	1 x 4-lane MIPI CSI, 1 x 2-lane MIPI CSI
Ethernet	Transceiver	NXP i.MX8M GbE controller Integrated RGMII 1 x RTL8119I-CG Giga LAN controller
	Speed	2 x 10/100/1000 Mbps
Watch Dog Timer	HW WDT	MSP430 (time out: 0.1~6553.5s, power on/off 4s)
I/O	USB	2 x USB3.0, 4 x USB2.0 Host, 1 x USB 2.0 OTG,
	I2S	2
	SDIO	1
	UART	1 x UART w/ 4wires, 3 x UART w/ 2wires,
	SPI	1
	GPIO	12
	I2C	4
	PCIE	1 x PCIe2.0 1-lane
O.S	Linux	Yocto
Dimensions	W x D	82 x 50mm
Power	DC-In	Fixed 5V DC source and allow 3.3 V ~ 5.25 V operates directly from single level Lithium Ion cells

Environment	Operational Temperature	0 ~ 60 °C/ -40 ~ 85 °C
	Operating Humidity	0% ~ 90% relative humidity, non-condensing
Certifications	Level	CE / FCC Class B

1.3 Mechanical Specifications

- **Dimensions:** SMARC form factor size, 82mm (D) x 50 mm(W)
- **Height on Top:** Under 3.0 mm base on SPEC definition (without heat sink)
- **Height on Bottom:** Under 1.3 mm base on SPEC definition



1.4 Electrical Specifications

- **Power Supply Voltage:**
 - Voltage requirements: +5 V
- **Power Supply Current:**

Model	Kernel idle	Maximum mode
ROM-5720	3 W	5.3 W

Test Conditions:

1. Test temperature: room temperature
2. Test voltage: rated voltage AC 110V/60Hz
3. Test loading:
 - 3.1 Maximum load mode: Running programs.
 - 3.2 Idle mode: DUT power management off and no running any program.
4. OS: Yocto 2.5
5. Test software: gst-launch-1.0, gpu test , cpu burning

1.5 Environmental Specifications

- **Operating Temperature:** 0 ~ 60° C/ -40 ~ 85° C
The operating temperature refers to the environmental temperature for the model.
- **Operating Humidity:** 5% ~ 95% relative humidity, non-condensing
- **Storage Temperature:** -40~85° C
- **Storage Humidity:**
 - Relative humidity: 95% @ 60° C

Chapter 2

H/W Installation

This chapter gives mechanical and connector information on the ROM-5720 CPU Computer on Module

Sections include:

- Connector Information
- Mechanical Drawing

2.1 Board Connectors

The board has one switch that allows you to configure your system



2.1.1 Connector List

External I/O Connector

Position	Description
SW1(1-2)	UART & Debug Port selection AT & ATX mode selection

SW1 (UART & Debug Port Selection)

Setting	Function
1-On	UART
1-Off	Debug (Default)

SW1 (AT/ATX Mode Selection)

Setting	Function
2-On	AT Mode (Default)
2- Off	ATX Mode

2.2 Block Diagram

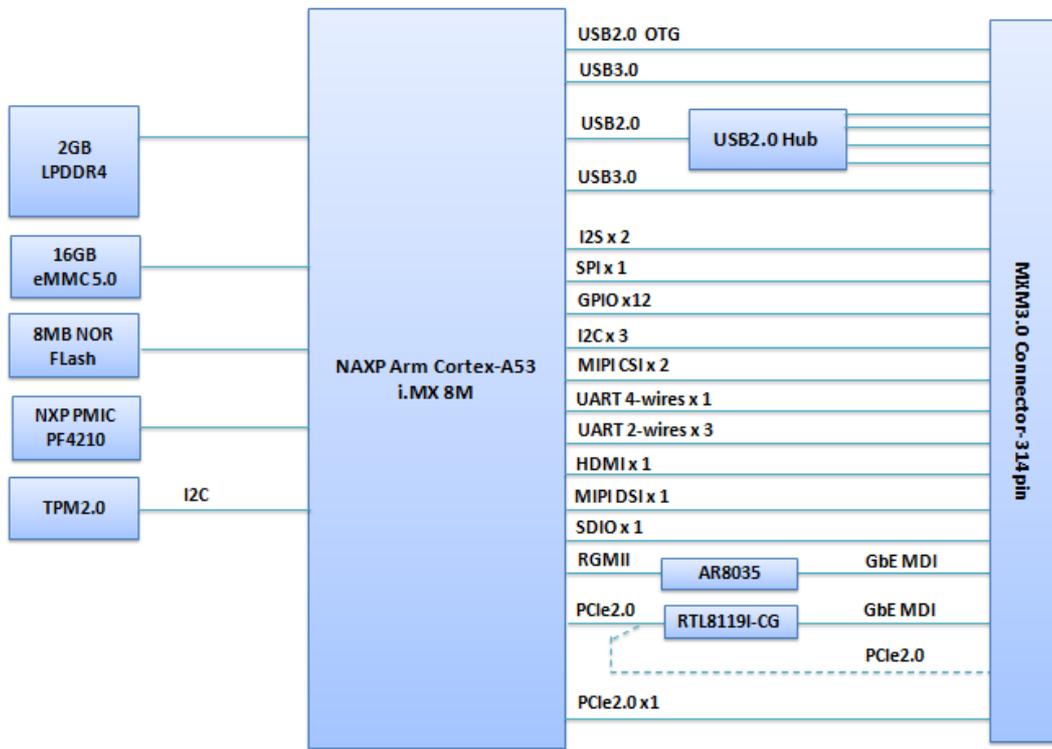


Figure 2.1 ROM-5720 Block Diagram

Chapter 3

Pin Definition

This chapter details the pin definitions of ROM-5720

3.1 Pin Definition

Here is the 314 Pin MXM connector pin define as below:

P-Pin	Primary (Top) Side SMARC2.0	ROM-5720 A101-4	S-Pin	Secondary (Bot- tom) Side SAMRC2.0	ROM-5720 A101-4
			S1	I2C_CAM1_CK	I2C_CAM1_CK
P1	SMB_ALERT_1V8#	SMB_ALERT_1V8#	S2	I2C_CAM1_DAT	I2C_CAM1_DAT
P2	GND	GND	S3	GND	GND
P3	CSI1_CK+	CSI1_CK+	S4	RSVD	N/A
P4	CSI1_CK-	CSI1_CK-	S5	I2C_CAM0_CK	I2C_CAM0_CK
P5	GBE1_SDP	N/A	S6	CAM_MCK	CAM_MCK
P6	GBE0_SDP	N/A	S7	I2C_CAM0_DAT	I2C_CAM0_DAT
P7	CSI1_RX0+	CSI1_RX0+	S8	CSI0_CK+	CSI0_CK+
P8	CSI1_RX0-	CSI1_RX0-	S9	CSI0_CK-	CSI0_CK-
P9	GND	GND	S10	GND	GND
P10	CSI1_RX1+	CSI1_RX1+	S11	CSI0_RX0+	CSI0_RX0+
P11	CSI1_RX1-	CSI1_RX1-	S12	CSI0_RX0-	CSI0_RX0-
P12	GND	GND	S13	GND	GND
P13	CSI1_RX2+	CSI1_RX2+	S14	CSI0_RX1+	CSI0_RX1+
P14	CSI1_RX2-	CSI1_RX2-	S15	CSI0_RX1-	CSI0_RX1-
P15	GND	GND	S16	GND	GND
P16	CSI1_RX3+	CSI1_RX3+	S17	GBE1_MDI0+	GBE1_MDI0+
P17	CSI1_RX3-	CSI1_RX3-	S18	GBE1_MDI0-	GBE1_MDI0-
P18	GND	GND	S19	GBE1_LINK100#	GBE1_LINK100#
P19	GBE0_MDI3-	GBE0_MDI3-	S20	GBE1_MDI1+	GBE1_MDI1+
P20	GBE0_MDI3+	GBE0_MDI3+	S21	GBE1_MDI1-	GBE1_MDI1-
P21	GBE0_LINK100#	GBE0_LINK100#	S22	GBE1_LINK1000#	GBE1_LINK1000#
P22	GBE0_LINK1000#	GBE0_LINK1000#	S23	GBE1_MDI2+	GBE1_MDI2+
P23	GBE0_MDI2-	GBE0_MDI2-	S24	GBE1_MDI2-	GBE1_MDI2-
P24	GBE0_MDI2+	GBE0_MDI2+	S25	GND	GND
P25	GBE0_LINK_ACT#	GBE0_LINK_ACT#	S26	GBE1_MDI3+	GBE1_MDI3+
P26	GBE0_MDI1-	GBE0_MDI1-	S27	GBE1_MDI3-	GBE1_MDI3-
P27	GBE0_MDI1+	GBE0_MDI1+	S28	GBE1_CTREF	N/A
P28	GBE0_CTREF	N/A	S29	PCIE_D_TX+	N/A
P29	GBE_MDI0-	GBE_MDI0-	S30	PCIE_D_TX-	N/A
P30	GBE_MDI0+	GBE_MDI0+	S31	GBE1_LINK_ACT#	GBE1_LINK_ACT#
P31	SPI0_CS1#	N/A	S32	PCIE_D_RX+	N/A
P32	GND	GND	S33	PCIE_D_RX-	N/A
P33	SDIO_WP	SDIO_WP	S34	GND	GND
P34	SDIO_CMD	SDIO_CMD	S35	USB4+	USB4+
P35	SDIO_CD#	SDIO_CD#	S36	USB4-	USB4-
P36	SDIO_CK	SDIO_CK	S37	USB3_VBUS_DET	N/A
P37	SDIO_PWR_EN	SDIO_PWR_EN	S38	AUDIO_MCK	AUDIO_MCK
P38	GND	GND	S39	I2S0_LRCK	I2S0_LRCK
P39	SDIO_D0	SDIO_D0	S40	I2S0_SDOUT	I2S0_SDOUT
P40	SDIO_D1	SDIO_D1	S41	I2S0_SDIN	I2S0_SDIN
P41	SDIO_D2	SDIO_D2	S42	I2S0_CK	I2S0_CK
P42	SDIO_D3	SDIO_D3	S43	ESPI_ALERT0#	N/A
P43	SPI0_CS0#	SPI0_CS0#	S44	ESPI_ALERT1#	N/A
P44	SPI0_CK	SPI0_CK	S45	RSVD	N/A

P45	SPI0_DIN	SPI0_DIN	S46	RSVD	N/A
P46	SPI0_DO	SPI0_DO	S47	GND	GND
P47	GND	GND	S48	I2C_GP_CK	I2C_GP_CK
P48	SATA_TX+	N/A	S49	I2C_GP_DAT	I2C_GP_DAT
P49	SATA_TX-	N/A	S50	I2S2_LRCK	I2S2_LRCK
P50	GND	GND	S51	I2S2_SDOUT	I2S2_SDOUT
P51	SATA_RX+	N/A	S52	I2S2_SDIN	I2S2_SDIN
P52	SATA_RX-	N/A	S53	I2S2_CK	I2S2_CK
P53	GND	GND	S54	SATA_ACT#	N/A
P54	ESPI_CS0#	N/A	S55	USB5_EN_OC#	N/A
P55	ESPI_CS1#	N/A	S56	ESPI_IO_2	N/A
P56	ESPI_CK	N/A	S57	ESPI_IO_3	N/A
P57	ESPI_IO_0	N/A	S58	ESPI_RESET#	N/A
P58	ESPI_IO_1	N/A	S59	USB5+	N/A
P59	GND	GND	S60	USB5-	N/A
P60	USB0+	USB0+	S61	GND	GND
P61	USB0-	USB0-	S62	USB3_SSTX+	USB3_SSTX+
P62	USB0_EN_OC#	USB0_EN_OC#	S63	USB3_SSTX-	USB3_SSTX-
P63	USB0_VBUS_DET	USB0_VBUS_DET	S64	GND	GND
P64	USB0_OTG_ID	USB0_OTG_ID	S65	USB3_SSRX+	USB3_SSRX+
P65	USB1+	USB1+	S66	USB3_SSRX-	USB3_SSRX-
P66	USB1-	USB1-	S67	GND	GND
P67	USB1_EN_OC#	USB1_EN_OC#	S68	USB3+	USB3+
P68	GND	GND	S69	USB3-	USB3-
P69	USB2+	USB2+	S70	GND	GND
P70	USB2-	USB2-	S71	USB2_SSTX+	USB2_SSTX+
P71	USB2_EN_OC#	USB2_EN_OC#	S72	USB2_SSTX-	USB2_SSTX-
P72	RSVD	N/A	S73	GND	GND
P73	RSVD	N/A	S74	USB2_SSRX+	USB2_SSRX+
P74	USB3_EN_OC#	USB3_EN_OC#	S75	USB2_SSRX-	USB2_SSRX-
<Key>			<Key>		
P75	PCIE_A_RST#	PCIE_A_RST#	S76	PCIE_B_RST#	PCIE_B_RST#
P76	USB4_EN_OC#	USB4_EN_OC#	S77	PCIE_C_RST#	N/A
P77	RSVD	N/A	S78	PCIE_C_RX+	N/A
P78	RSVD	N/A	S79	PCIE_C_RX-	N/A
P79	GND	GND	S80	GND	GND
P80	PCIE_C_REFCK+	N/A	S81	PCIE_C_TX+	N/A
P81	PCIE_C_REFCK-	N/A	S82	PCIE_C_TX-	N/A
P82	GND	GND	S83	GND	GND
P83	PCIE_A_REFCK+	PCIE_A_REFCK+	S84	PCIE_B_REFCK+	PCIE_B_REFCK+
P84	PCIE_A_REFCK-	PCIE_A_REFCK-	S85	PCIE_B_REFCK-	PCIE_B_REFCK-
P85	GND	GND	S86	GND	GND
P86	PCIE_A_RX+	PCIE_A_RX+	S87	PCIE_B_RX+	PCIE_B_RX+
P87	PCIE_A_RX-	PCIE_A_RX-	S88	PCIE_B_RX-	PCIE_B_RX-
P88	GND	GND	S89	GND	GND
P89	PCIE_A_TX+	PCIE_A_TX+	S90	PCIE_B_TX+	PCIE_B_TX+
P90	PCIE_A_TX-	PCIE_A_TX-	S91	PCIE_B_TX-	PCIE_B_TX-
P91	GND	GND	S92	GND	GND
P92	HDMI_D2+	HDMI_D2+	S93	DP0_LANE0+	N/A
P93	HDMI_D2-	HDMI_D2-	S94	DP0_LANE0-	N/A
P94	GND	GND	S95	DP0_AUX_SEL	N/A
P95	HDMI_D1+	HDMI_D1+	S96	DP0_LANE1+	N/A

P96	HDMI_D1-	HDMI_D1-	S97	DP0_LANE1-	N/A
P97	GND	GND	S98	DP0_HPD	N/A
P98	HDMI_D0+	HDMI_D0+	S99	DP0_LANE2+	N/A
P99	HDMI_D0-	HDMI_D0-	S100	DP0_LANE2-	N/A
P100	GND	GND	S101	GND	GND
P101	HDMI_CK+	HDMI_CK+	S102	DP0_LANE3+	N/A
P102	HDMI_CK-	HDMI_CK-	S103	DP0_LANE3-	N/A
P103	GND	GND	S104	USB3_OTG_ID	N/A
P104	HDMI_HPD	HDMI_HPD	S105	DP0_AUX+	N/A
P105	HDMI_CTRL_CK	HDMI_CTRL_CK	S106	DP0_AUX-	N/A
P106	HDMI_CTRL_DAT	HDMI_CTRL_DAT	S107	LCD1_BKLT_EN	N/A
P107	DP1_AUX_SEL	N/A	S108	LVDS1_CK+ / eDP1_AUX+ / DSI1_CLK+	N/A
P108	GPIO0/ CAM0_PWR#	GPIO0/ CAM0_PWR#	S109	LVDS1_CK- / eDP1_AUX- / DSI1_CLK-	N/A
P109	GPIO1/ CAM1_PWR#	GPIO1/ CAM1_PWR#	S110	GND	GND
P110	GPIO2/ CAM0_RST#	GPIO2/ CAM0_RST#	S111	LVDS1_0+ / eDP1_TX0+ / DSI1_D0+	N/A
P111	GPIO3/ CAM1_RST#	GPIO3/ CAM1_RST#	S112	LVDS1_0- / eDP1_TX0- / DSI1_D0-	N/A
P112	GPIO4	GPIO4	S113	eDP1_HPD	N/A
P113	GPIO5	GPIO5	S114	LVDS1_1+ / eDP1_TX1+ / DSI1_D1+	N/A
P114	GPIO6	GPIO6	S115	LVDS1_1- / eDP1_TX1- / DSI1_D1-	N/A
P115	GPIO7	GPIO7	S116	LCD1_VDD_EN	N/A
P116	GPIO8	GPIO8	S117	LVDS1_2+ / eDP1_TX2+ / DSI1_D2+	N/A
P117	GPIO9	GPIO9	S118	LVDS1_2- / eDP1_TX2- / DSI1_D2-	N/A
P118	GPIO10	GPIO10	S119	GND	GND
P119	GPIO11	GPIO11	S120	LVDS1_3+ / eDP1_TX3+ / DSI1_D3+	N/A
P120	GND	GND	S121	LVDS1_3- / eDP1_TX3- / DSI1_D3-	N/A
P121	I2C_PM_CK	I2C_PM_CK	S122	LCD1_BKLT_PWM	N/A
P122	I2C_PM_DAT	I2C_PM_DAT	S123	RSVD	N/A
P123	BOOT_SEL0#	BOOT_SEL0#	S124	GND	GND
P124	BOOT_SEL1#	BOOT_SEL1#	S125	DSI0_D0+	DSI0_D0+
P125	BOOT_SEL2#	BOOT_SEL2#	S126	DSI0_D0-	DSI0_D0-
P126	RESET_OUT#	RESET_OUT#	S127	LCD0_BKLT_EN	LCD0_BKLT_EN
P127	RESET_IN#	RESET_IN#	S128	DSI0_D1+	DSI0_D1+
P128	POWER_BTN#	POWER_BTN#	S129	DSI0_D1-	DSI0_D1-
P129	SER0_TX	SER0_TX	S130	GND	GND
P130	SER0_RX	SER0_RX	S131	DSI0_D2+	DSI0_D2+

P131	SER0_RTS#	SER0_RTS#	S132	DSI0_D2-	DSI0_D2-
P132	SER0_CTS#	SER0_CTS#	S133	LCD0_VDD_EN	LCD0_VDD_EN
P133	GND	GND	S134	DSI0_CLK+	DSI0_CLK+
P134	SER1_TX	SER1_TX	S135	DSI0_CLK-	DSI0_CLK-
P135	SER1_RX	SER1_RX	S136	GND	GND
P136	SER2_TX	SER2_TX	S137	DSI0_D3+	DSI0_D3+
P137	SER2_RX	SER2_RX	S138	DSI0_D3-	DSI0_D3-
P138	SER2_RTS#	N/A	S139	I2C_LCD_CK	I2C_LCD_CK
P139	SER2_CTS#	N/A	S140	I2C_LCD_DAT	I2C_LCD_DAT
P140	SER3_TX	SER3_TX	S141	LCD0_BKLT_PWM	LCD0_BKLT_PWM
P141	SER3_RX	SER3_RX	S142	RSVD	N/A
P142	GND	GND	S143	GND	GND
P143	CAN0_TX	N/A	S144	eDP0_HPD	N/A
P144	CAN0_RX	N/A	S145	WDT_TIME_OUT#	WDT_TIME_OUT#
P145	CAN1_TX	N/A	S146	PCIE_WAKE#	PCIE_WAKE#
P146	CAN1_RX	N/A	S147	VDD_RTC	VDD_RTC
P147	VDD_IN	VDD_IN	S148	LID#	LID#
P148	VDD_IN	VDD_IN	S149	SLEEP#	SLEEP#
P149	VDD_IN	VDD_IN	S150	VIN_PWR_BAD#	VIN_PWR_BAD#
P150	VDD_IN	VDD_IN	S151	CHARGING#	CHARGING#
P151	VDD_IN	VDD_IN	S152	CHARGER_PRSNT#	CHARGER_PRSNT#
P152	VDD_IN	VDD_IN	S153	CARRIER_STBY#	CARRIER_STBY#
P153	VDD_IN	VDD_IN	S154	CARRIER_PWR_ON	CARRIER_PWR_ON
P154	VDD_IN	VDD_IN	S155	FORCE_RECOV#	FORCE_RECOV#
P155	VDD_IN	VDD_IN	S156	BATLOW#	BATLOW#
P156	VDD_IN	VDD_IN	S157	TEST#	TEST#
			S158	GND	GND

Chapter 4

Software Functionality

This chapter details the software programs on the ROM-5720 platform

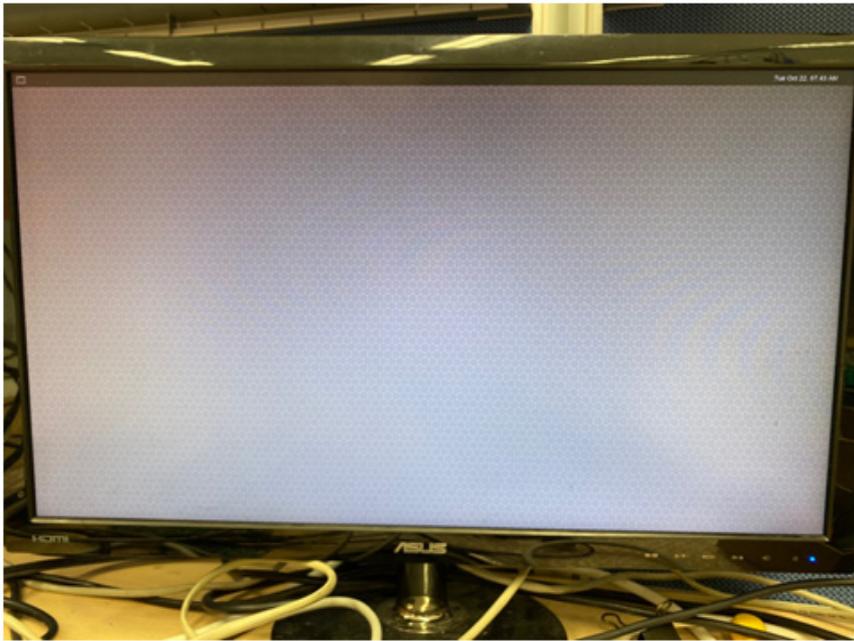
4.1 Test Tools

All test tools must be verified on the ROM-5720 evaluation kit. Please prepare the required test fixtures before verifying each specified I/O. If you have any problems with testing, please contact your Advantech contact window for help.

4.1.1 Display

4.1.1.1 HDMI

The default Weston UI (1920x1080) will be displayed on the screen.



Test different resolutions

Step 1: Disable weston UI

```
# systemctl stop weston
```

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

```
# modetest -c
```

```

id      encoder status      name      size (mm)      modes      encod-
ers
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
```

4.1.1.2 MIPI-DSI to HDMI

Step 1: Connect MIPI-DSI to HDMI 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 adv-imx8mq-rom5720-a1-dcss-adv7535-b3.dtb ; boot

```

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

4.1.1.3 Dual Display

Connect HDMI and MIPI-DSI to HDMI cable

```
setenv mmcargs setenv bootargs ${jh_clk} console=${console} modprobe.blacklist=${modprobe.blacklist} root=${mmccroot}
setenv fdt_file adv-imx8mq-rom5720-a1-dual-display.dtb
```

Then weston will show on MIPI-DSI to HDMI

Playback video on MIPI-DSI to HDMI

```
gst-launch-1.0 filesrc location=HDMI.mp4 ! qtdemux ! h264parse ! vpudec !
waylandsink
```

Playback video on HDMI

```
gst-launch-1.0 filesrc location=HDMI.mp4 ! qtdemux ! h264parse ! vpudec !
kmsink
```

4.1.2 Audio Test

Check audio codec

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

HDMI Audio

Connect headphone on HDMI monitor

```
# aplay -D plughw:1,0 /unit_tests/Audio/sample_22_frames.mp3
```

Audio Codec(SGTL5000)

Connect Audio daughter board (ROM-EG51) on I2S_CN3 of ROM-DB5901 carrier board.

Set MIC and headphone

```
# amixer set Mic 100%
Simple mixer control 'Mic',0
  Capabilities: volume volume-joined
  Playback channels: Mono
  Capture channels: Mono
  Limits: 0 - 3
  Mono: 3 [100%] [40.00dB]
#amixer set Headphone 100%
Simple mixer control 'Headphone',0
  Capabilities: pvolume pswitch pswitch-joined
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 127
  Mono:
  Front Left: Playback 127 [100%] [12.00dB] [on]
  Front Right: Playback 127 [100%] [12.00dB] [on]
```

Record and playback

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

4.1.3 4G Test

Test 3G/4G (Quectel EC-25-AU USB Signal)

Step1 Connect the PCIe card (9680015491) to Mini-PCIe Slot



Step2 Execute the pppd to connect the network.

```
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" ""' user
username password password /dev/ttyUSB2 460800 nodetach crtscts debug use-
peerdns defaultroute &
```

4.1.4 WIFI/BT Test

Test Wifi card (EWM-W163M201E PCIe signal)

```
# 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 signal)

```
$ 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
```

4.1.5 RS-232 test

ROM-5720(iMX8M)	ROM-DB5901 Carrier Board COM Port Name
ttymxc0	COM3 (debug port)
ttymxc1	COM2
ttymxc2	COM0
ttymxc3	COM1

Loopback test (eg. ttymxc1)

Before loopback test, we should connect tx and rx

```
#stty -F /dev/ttymxc1 115200
#stty -F /dev/ttymxc1 ?echo
#cat /dev/ttymxc1 &
#echo test > /dev/ttymxc1
```

4.1.6 I²C test

Check I²C Device (audio codec: 2-000a)

```
root@imx8mqrom5720a1 : ~# i2cdetect -y 2
0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  UU  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  --  --  --  --  --  --  --  --  UU  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  UU  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
```

I²C set and get

```
root@imx8mqrom5720a1 : ~# i2cset -f -y 2 0x0a 0 0xff00 w
root@imx8mqrom5720a1 : ~# i2cget -f -y 2 0x0a w
0x11a0
```

4.1.7 USB test

USB disk test(2.0/3.0)

After insert usb disk to 2.0 or 3.0 port

```
root@imx8mqrom5720a1 : ~# lsusb -t
/: Bus 04. Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/lp, 5000M
/: Bus 03. Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/lp, 480M
   I__ Port 1: Dev 2, If 0, Class=Hub, Driver=hub/4p, 480M
I__   Port 1: Dev 3, If 0, Class=Hub, Driver=hub/2p, 480M
I__   Port 1: Dev 4, If 0, Class=Mass Storage, Driver=usb-storage,
480M
/: Bus 02. Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/lp, 5000M
   I__ 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/lp, 480M
```

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

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

4.1.8 RTC Test

Disable RTC sync service

```
root@imx8mqrom5720a1 : ~# systemctl stop systemd-timesyncd
root@imx8mqrom5720a1 : ~# systemctl stop ntpdate . service
```

Set system time to current, then write to RTC

```
root@imx8mqrom5720a1 : ~# date 021710452016 && hwclock -w && date
Wed Feb 17 10 : 45 : 00 UTC 2016
Wed Feb 17 10 : 45 : 00 UTC 2016
```

Set one incorrect time, then read time from RTC to verify

```
root@imx8mqrom5720a1 : ~# date 010100002000 && hwclock -r && date
Sat Jan 1 00 : 00 : 00 UTC 2000
Wed Feb 17 10 : 46 : 25 2016 0 . 000000 seconds
Sat Jan 1 00 : 00 : 00 UTC 2000
root@imx8mqrom5720a1 : ~#
```

Restore the RTC time to system time

```
root@imx8mqrom5720a1 : ~# hwclock -s && date
Wed Feb 17 10 :46 :43 UTC 2016
```

4.1.9 eMMC/SD/SPI flash test

eMMC: /dev/mmcblk0

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
```

4.1.10 Ethernet Test

Check Ethernet device

```
root@imx8mqrom5720a1 : ~# ifconfig
eth0 Link encap : Ethernet HWaddr 00 : 04 : 9f : 01 : 30 : e0
      UP BROADCAST MULTICAST DYNAMIC MTU : 1500 Metric : 1
      RT 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)

Eth0:0 Link encap : Ethernet HWaddr 00 : 04 : 9f : 01 : 30 : e0
      inet addr : 192 . 168 . 0 . 1 Bcast : 192 . 168 . 0 . 255
      Mask:255.255.255.0
      UP BROADCAST MULTICAST DYNAMIC MTU : 1500 Metric : 1

Eth1 Link encap : Ethernet HWaddr 00 : 00 : 00 : 00 : 00 : 05
      inet addr : 172 . 22 . 28 . 100 Bcast : 172 . 22 . 31 . 255
      Mask:255.255.255.0
      inet6 addr : fe80 :: 200 : ff : fe00 : 5/64 Scope: Link
      UP BROADCAST MULTICAST DYNAMIC MTU : 1500 Metric : 1
      RT packets : 0119316 errors : 0 dropped : 27150 overruns: 0
      frame : 0
      TX packets : 4101 errors : 0 dropped : 0 overruns: 0 carrier : 0
      Collisions : 0 txqueuelen : 1000
      RX bytes : 15301517 (14.5 MiB) TX bytes: 850758 (830 . 8 KiB)

Eth1:0 Link encap : Ethernet HWaddr 00 : 04 : 9f : 01 : 30 : e0
      inet addr : 192 . 168 . 1 . 1 Bcast : 192 . 168 . 1 . 255
      Mask:255.255.255.0
      UP BROADCAST MULTICAST DYNAMIC MTU : 1500 Metric : 1
```

Connect cable and ping test (eg. eth1)

```
root@imx8mqrom5720a1 : ~# ping -I eth1 8 . 8 . 8 . 8
PING 8 . 8 . 8 . 8 (8 . 8 . 8 . 8) from 172 . 22 . 28 . 100 eth1: 56 (84)
bytes of data.
64 bytes from 8 . 8 . 8 . 8: icmp_seq=1 ttl=54 time=1.95 ms
64 bytes from 8 . 8 . 8 . 8: icmp_seq=2 ttl=54 time=2.02 ms
^C
- - - 8 . 8 . 8 . 8 ping statistics - - -
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 1.957 / 1.989 / 2.021 / 0.032 ms
```

4.1.11 GPIO Test

GPIO pin

SMARC Pin #	SMARC Pin Name	CPU Ball Name	Kernel GPIO	Default Direction
P108	GPIO0/CAM0_PWR	MX8MQ_IOMUXC_GPIO1_IO03	3	In
P109	GPIO1/CAM1_PWR	MX8MQ_IOMUXC_GPIO1_IO05	125	In
P110	GPIO2/CAM0_RST	MX8MQ_IOMUXC_SAI3_RXC	5	In
P111	GPIO3/CAM1_RST	MX8MQ_IOMUXC_GPIO1_IO06	6	In
P112	GPIO	MX8MQ_IOMUXC_GPIO1_IO00	0	In
P113	GPIO5	MX8MQ_IOMUXC_SPDIF_RX	132	In
P114	GPIO6	MX8MQ_IOMUXC_SAI5_RXFS	83	In
P115	GPIO7	MX8MQ_IOMUXC_SAI5_RXD0	85	In
P116	GPIO8	MX8MQ_IOMUXC_GPIO1_IO08	8	In
P117	GPIO9	MX8MQ_IOMUXC_SAI5_RXD2	87	In
P118	GPIO10	MX8MQ_IOMUXC_SAI3_RXFS	124	In
P119	GPIO11	MX8MQ_IOMUXC_SAI1_RXFS	96	In

Loopback test (Take GPIO4 and GPIO5 as an example)

Step 1: Connect GPIO4 and GPIO5

Step 2: Export GPIO interface

```
root@imx8mqrom5720a1 : ~# echo 0 > /sys/class/gpio/export
root@imx8mqrom5720a1 : ~# echo 132 > /sys/class/gpio/export
```

Step 3: Set direction

```
root@imx8mqrom5720a1 : ~# echo out > /sys/class/gpio/gpio1/direction
root@imx8mqrom5720a1 : ~# echo in > /sys/class/gpio/gpio2/direction
```

Step 4: Read value and set output value than check

```
root@imx8mqrom5720a1 : ~# cat /sys/class/gpio/gpio2/value
1
root@imx8mqrom5720a1 : ~# echo 0 > /sys/class/gpio/gpio1/value
root@imx8mqrom5720a1 : ~# cat /sys/class/gpio/gpio2/value
0
```

4.1.12 Watchdog Test

System will reboot after 1 sec

```
root@imx8mqrom5720a1 : ~# /unit_tests/Watchdog/wdt_driver_test.out 1 2 0
- - - - Running < /unit_tests/watchdog/wdt_driver_test.out > test - -
- -
Starting wdt_driver (timeout: 1, sleep: 2, test: ioctl)
Trying to set time out value=1 seconds
```

4.1.13 Camera Test

Take a picture from camera1

```
# gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=1 ! 'video/x-raw,format=(string)YUY2,width=640,height=480,framerate=(fraction)30/1' !
jpegenc ! filesink location=/tmp/capture.jpeg
```

Take a picture from camera 2

```
# gst-launch-1.0 v4l2src device=/dev/video1 num-buffers=1 ! 'video/x-raw,format=(string)YUY2,width=640,height=480,framerate=(fraction)30/1' !
jpegenc ! filesink location=/tmp/capture.jpeg
```

Show picture

```
#gst-launch-1.0 filesrc location=capture.jpeg ! jpegdec ! imagefreeze !
autovideosink
```

Chapter 5

System Recovery

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

5.1 System Recovery

This section provides detailed procedures for restoring the eMMC image. If you destroy the onboard flash image by accident, you can recover the system by following these steps.

5.1.1 Recovery by SD Card

1. Copy 5720A1AILIV90022xx to your desktop
2. Insert SD card to PC
3. Make a bootable sd card

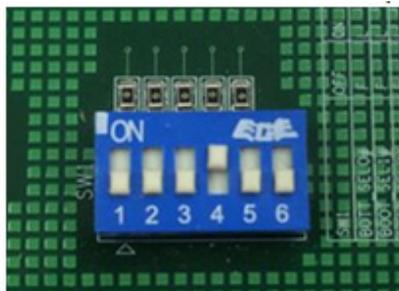
```
# tar zxvf 5720A1AIM20LIV90022_iMX8M_flash_tool.tgz
# cd 5720A1AIM20LIV90022_iMX8M_flash_tool/mk_inand/
# sudo ./mksd-linux.sh /dev/sdg
```

4. Insert SD card and copy 5720A1AIM20LIV90022_iMX8M_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 5720A1AIM20LIV90022_iMX8M_flash_tool/mk_inand/
# sudo ./mksd-linux.sh /dev/mmcblk0
```

5.1.2 Recovery by UUU Tool

1. Download uuu tool from (<https://github.com/ADVANTECH-Corp/uuu/releases/tag/v20191101>)
2. Create a folder with files as below:
 - 1) uuu
 - 2) imx-boot-imx8mqrom5720a1-sd.bin-flash_evk
 - 3) fsl-image-validation-imx-imx8mqrom5720a1-20190917152605.rootfs.sdcard
3. Connect otg cable from PC to device
4. Set the correct boot mode on the carrier board, then power on



Perform the following command:

```
sudo ./uuu -b emmc_all imx-boot-imx8mqrom5720a1-sd.bin-flash_evk fsl-image-validation-imx-imx8mqrom5720a1-20190917152605.rootfs.sdcard
```

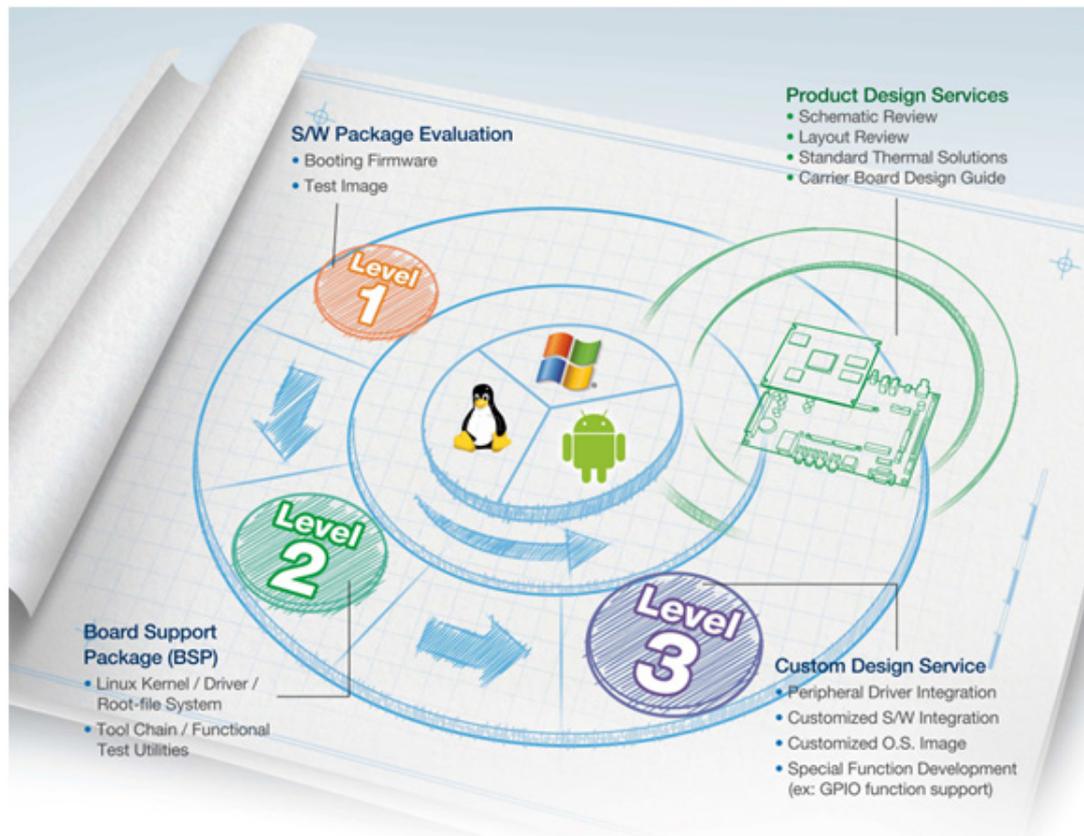
5. uuu tool will start recovery image to emmc.
6. For more usage
<https://github.com/NXPmicro/mfgtools/wiki>

Chapter 6

Advantech Services

This chapter introduces Advantech Design-In serviceability, technical support and warranty policy for ROM-5720 evaluation kit

6.1 RISC Design-In Services



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

Easy Development

Advantech has support firmware, root file-system, BSP or other develop tools for customers. It helps customers to easy develop their carrier board and differentiate their embedded products and applications.

- Full Range of RISC Product Offerings
- Comprehensive Document Support

Design Assistance Service

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

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

Thermal Solution Services

In order to provide quicker and more flexible solutions for customer's thermal designs. Advantech provides a thermal solution service including modularized thermal solutions and customized thermal solutions.

- Standard Thermal Solutions
- Customized Thermal Solutions

Embedded Software Services

Supports driver, software integration or customized firmware, root file-system and Linux image. Customer can save 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. 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 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 often possess the ability to perform vertical integration and have enough know-how and core competitiveness in the professional application field, the lack of expertise and experience in general power and I/O design causes many challenges for them; especially when integrating CPU modules into carrier boards.

The Acquisition of Information

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

Software Development and Modification

Compared to x86 architectures, RISC architectures use simpler instruction sets, therefore the software support for x86 platforms cannot be used on RISC platforms. System integrators need to develop software for their system and do the hardware and software integration themselves. Unlike x86 platforms, RISC platforms have less support for Board Support Packages (BSP) and drivers as well. Even though driver support is provided, SI still have to make a lot of effort to integrate it into the system core. Moreover, the BSP provided by CPU manufacturers are usually for carrier board design, so it's difficult for SI to have an environment for software development. In view of this, Advantech proposed the concept of Streamlined Design-in Support Services for RISC-based Computer On Modules (COM). With a dedicated profes-

sional design-in services team, Advantech actively participates in carrier board design and problem solving. Our services not only enable customers to effectively distribute their resources but also reduce R&D manpower cost and hardware investment.

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

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

Along with our multi-stage development process which includes: planning, design, integration, and validation, Advantech's RISC design-in service provides comprehensive support to the following different 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 when developing RISC COMs. In the planning stage, customers can use this evaluation board to assess RISC modules and test peripheral hardware. What's more, Advantech provides standard software Board Support Package (BSP) for RISC COM, so that customers can define their product's specifications as well as verifying I/O and performance at the same time. We not only offer hardware planning and technology consulting, but also software evaluation and peripheral module recommendations (such as WiFi, 3G, BT). Resolving customer concerns is Advantech's main target at this stage. Since we all know that product evaluation is the key task in the planning period, especially for performance and specification, so we try to help our customers conduct all the necessary tests for their RISC COM.

Design Stage

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

Integration Stage

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

Validation stage

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

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

6.2 Contact Information

Below is the contact information for Advantech customer service

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

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

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

6.3 Technical Support and Assistance

6.3.1 Warranty Policy

Below is the warranty policy for Advantech products:

6.3.1.1 Warranty Period

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

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

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

6.3.1.2 Repairs Under Warranty

It is possible to obtain a replacement (Cross-Shipment) during the first 30 days of the purchase, thru your original ADVANTECH supplier to arrange DOA replacement if the products were purchased directly from ADVANTECH and the product is DOA (Dead-on-Arrival). The DOA Cross-Shipment excludes any shipping damage, customized and/or build-to-order products.

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

6.3.1.3 Exclusions From Warranty

The product is excluded from warranty if

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

6.3.2 Repair Process

6.3.2.1 Obtaining an RMA Number

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

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

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

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

6.3.2.2 Returning Products for Repair

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

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

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

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

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

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

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

6.3.2.3 Service Charges

The product is excluded from warranty if:

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

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

Please contact your nearest regional service center for detail service quotation.

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

6.3.2.4 Repair Report

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

6.3.2.5 Custody of Products Submitted for Repair

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

6.3.2.6 Shipping Back to Customer

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

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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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