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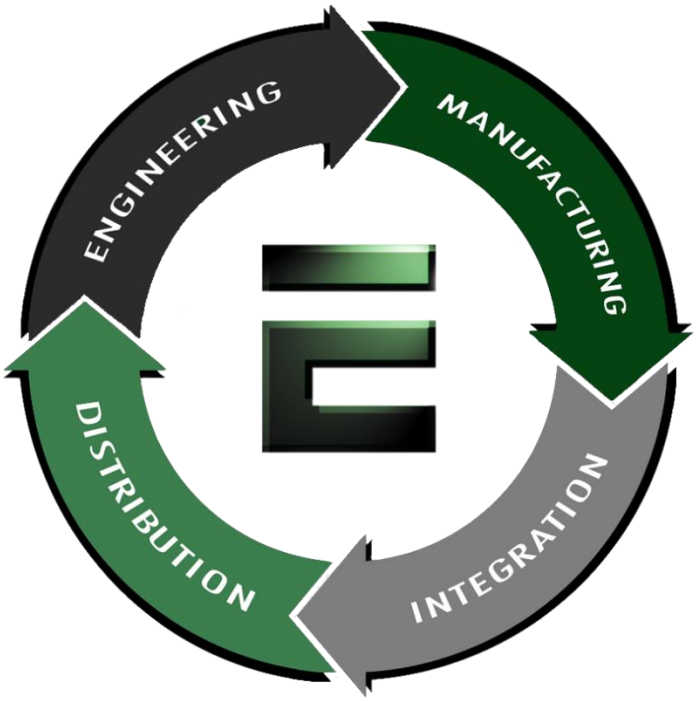
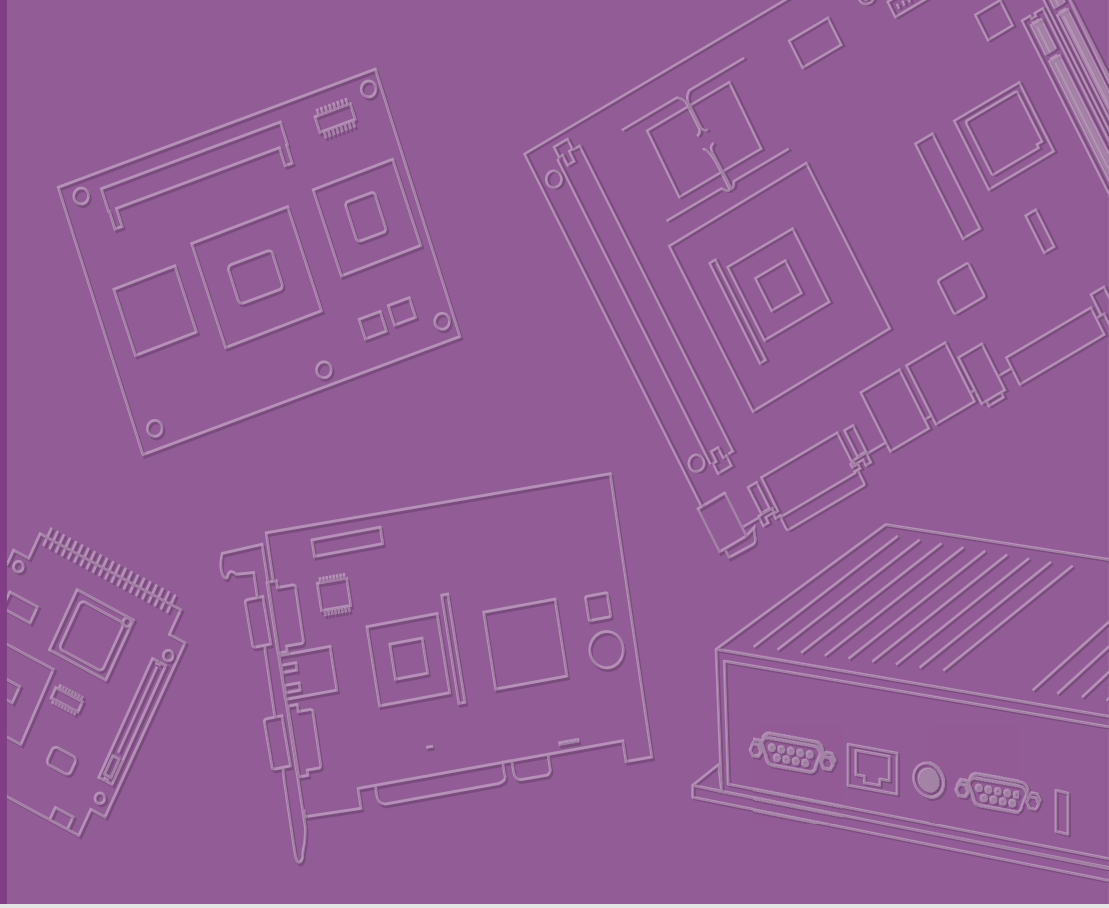


Authorized Distributor, Integrator and Value-Added Reseller

Manual and Datasheets available at: ftp.emacinc.com

For purchase information please contact info@emacinc.com

For Technical Support Services please submit a ticket at www.emacinc.com/support/



User Manual

ROM-5620

NXP i.MX8X Cortex®-A35 SMARC 2.0/2.1 Computer-on-Module

ADVANTECH

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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 on screen 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 return merchandise authorization (RMA) 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.

Part No. 2006562000 Edition 1

Printed in China May 2020

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-5620CE-OEA1E	SMARC2.0/2.1 NXP i.MX8X Dual Plus, 2GB, 0~60 °C (32 ~ 140 °F)
ROM-5620CU-OEA1E	SMARC2.0/2.1 NXP i.MX8X Quad Plus, 2GB, 0~60 °C (32 ~ 140 °F)
ROM-5620WE-OEA1E	SMARC2.0/2.1 NXP i.MX8X Dual Plus, 2GB, -40~85 °C (-40 ~ 185 °F)
ROM-5620WU-OEA1E	SMARC2.0/2.1 NXP i.MX8X Quad Plus, 2GB, -40~85 °C (-40 ~ 185 °F)
ROM-DB5901-SWA1	Development board for SMARC v2.0 RISC Module series

Packing List

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

- 1 x ROM-5620
- 4 x Screws
- 1 x China ROHS

Optional Accessories

Part No.	Description
1701100300	Debug port cable for ROM-5620
1700019474	D-SUB 9P(F)/D-SUB 9P(F) RS232/RS485 100c
1970004483T001	Heat Spreader for -40 ~ 85 °C (-40 ~ 185 °F)
1960063089N001	Semi Heat Sink for -40 ~ 85 °C (-40 ~ 185 °F)
193B021490	Screw for Heat Spreader and Semi Heat Sink
96PSA-A36W12R1-3	ADAPTER 100-240V 36W 12V 3A
1700001524	Power Cord 3P UL 10A 125V 180 cm (70.8 in)
170203183C	Power Cord 3P Europe (WS-010+WS-083) 183 cm (72 in)
170203180A	Power Cord 3P UK 2.5A/3A 250V 183cm (72 in)
1700008921	Power Cord 3P PSE 183cm (72 in)
SQF-ISDM1-16G-21C	SQF SD Card I-SD UHS-I MLC 16G (0~70 °C) (32 ~ 158 °F)
SQF-ISDM1-16G-21E	SQF I-SD UHS-I MLC 16G -40~85 °C (-40 ~ 185 °F)
EWM-W163M201E	802.11 a/b/g/n/ac,QCA6174A,2T2R,w/BT4.1,M.2 2230
1750008717-01	Dipole Ant. D.B 2.4/5G WIFI 3dBi SMA/M-R BLK
1750007965-01	Antenna Cable R/P SMA (M) to MHF4, 300 mm (11.8 in)
EWM-C117FL06E*	LTE 4G,3G WCDMA/DC-HSPA+, 2G module, MPCI-L280H
1750007990-01	Antenna 4G/LTE full band L=11 cm (94.3 in) 50 Ohm
1750006009	Antenna Cable SMA (F) to MHF 1.32 25cm (9.84 in)

*Please contact us for suggestions on suitable cellular modules for your region.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for future 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 over-voltage.
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.

Contents

Chapter 1

General Introduction

This chapter briefly introduces the ROM-5620 platform

Sections include:

- Introduction
- Specifications

1.1 Introduction

Advantech ROM-5620 SMARC2.0/2.1 Computer-on-Module (COM) is powered by NXP i.MX 8X SoC which features 2 ~ 4 Arm Cortex-A35 cores for applications in the automotive and industrial market. ROM-5620 has one Cortex-M4F core for real-time processing, and one Tensilica Hi-Fi 4 DSP for efficient audio and voice processing. A Vivante GC7000 Lite, 4K H.265 capable decoder, and dual 1080P60 display controllers enable excellent graphics processing performance. ROM-5620 is paired with Advantech's ROM-DB5901 Evaluation Carrier Board for faster end user peripheral integration and decreased time-to-market. Reference schematics, layout checklists, and other documentation necessary for carrier board development are provided. This package also includes open-sourced Linux BSP, test utilities, hardware design utilities, and reference drivers. ROM-5620 is an excellent choice for diverse industrial automation, medical, Human-machine-Interface, and portable applications.

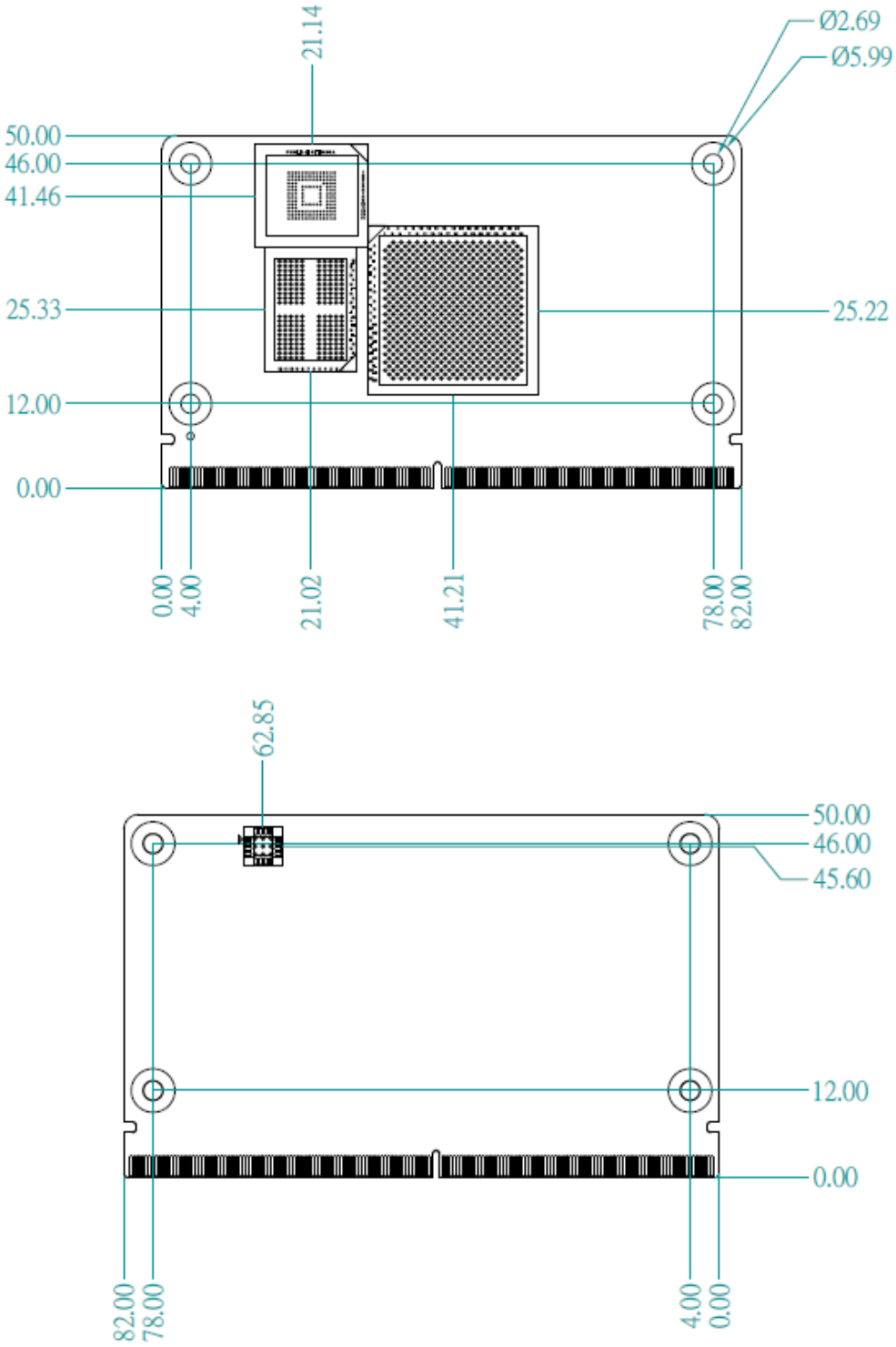
1.2 Product Features

Compatible Module		SMARC2.0 & SMARC2.1 compliance
Processor System	CPU	NXP i.MX 8DualXPlus (2 x Cortex-A35) or 8QuadXPlus (4 x Cortex-A35) 1.2GHz
	MCU	1 x Cortex-M4F core
	DSP	1 x Tensilica HiFi 4 DSP
Memory	Technology	LPDDR4 2400 MT/s
	Capacity	On-board 2GB LPDDR4
	Flash	16 GB eMMC NAND Flash for O.S. and 8 MB QSPI NOR Flash for board information
Graphics	LVDS/MIPI-DSI	2 x 24-bit single channel LVDS 1080p or 2 x 4-LANE MIPI DSI
	HDMI	-
	Parallel RGB	-
	VGA	-
	Graphics Engine	Vivante GC7000 Lite
	H/W Video Codec	Supports H.265/H.264(4Kp30), WMV9/VC-1 imple, MPEG-1, AVS, MPEG4.2 ASP, H.263 decode and H.264(1080p30) encode
Ethernet	Chipset	2 x NXP i.MX8X integrated RGMII
	Speed	2 x 10/100/1000 Mbps
RTC	RTC	Yes
Watchdog Timer		1~6553s, default 60s, power on/off 1s
Security		TPM 2.0

I/O	PCIe	1 x PCIe 3.0
	SATA	-
	USB	1 x USB 3.0, 1 x USB 2.0 Host, 1 x USB 2.0 OTG
	Audio	2 x I2S
	SPDIF	-
	SDIO	1
	Serial Port	1 x 4-wire UART and 2 x 2-wire UART
	SPI	2
	CAN	2 CANBus 2.0 A/B
	GPIO	12 GPIO Ports
	I2C	4 with interrupt
	Camera Input	1 x 4-Lane MIPI-CSI2
	System Bus	-
	Touch	-
	Keypad	-
Power	Power Supply Voltage	4.75~5.25V
	Power Consumption	4.45W (Max)
Environment	Operating Temperature	0 ~ 60 °C / -40 ~ 85 °C (32 ~ 140 °F / -40 ~ 185 °F)
	Operating Humidity	5% ~ 90% relative humidity, non-condensing
Mechanical	Dimensions (W x D)	82 x 50 mm (3.22 x 1.96 in)
Operation System		Linux & Android
Certifications		CE/FCC Class B

1.3 Mechanical Specifications

- **Dimensions:** SMARC form factor size: (D x W) 82 x 50 mm / 3.22 x 1.96 in
- **Height on Top:** Under 3.0 mm (0.11 in) base on SPEC definition (without heat sink)
- **Height on Bottom:** Under 1.3 mm (.051 in) base on SPEC definition



1.4 Electrical Specifications

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

Model	Kernel idle	Maximum mode
ROM-5620	2.46 W	4.45 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: qa.sh (heavy loading for CPU+VPU+GPU)

1.5 Environmental Specifications

- **Operating Temperature:** 0 ~ 60 °C/ -40 ~ 85 °C (32 ~ 140 °F / -40 ~ 185 °F)
  The operating temperature refers to the environmental temperature for the model.
- **Operating Humidity:** 5% ~ 95% relative humidity, non-condensing
- **Storage Temperature:** -40 ~ 60 °C / -40 ~ 85 °C (-40 ~ 140 °F / -40 ~ 185 °F)
- **Storage Humidity:**
  – Relative humidity: 95% @ 60 °C (140 °F)

Chapter 2

H/W Installation

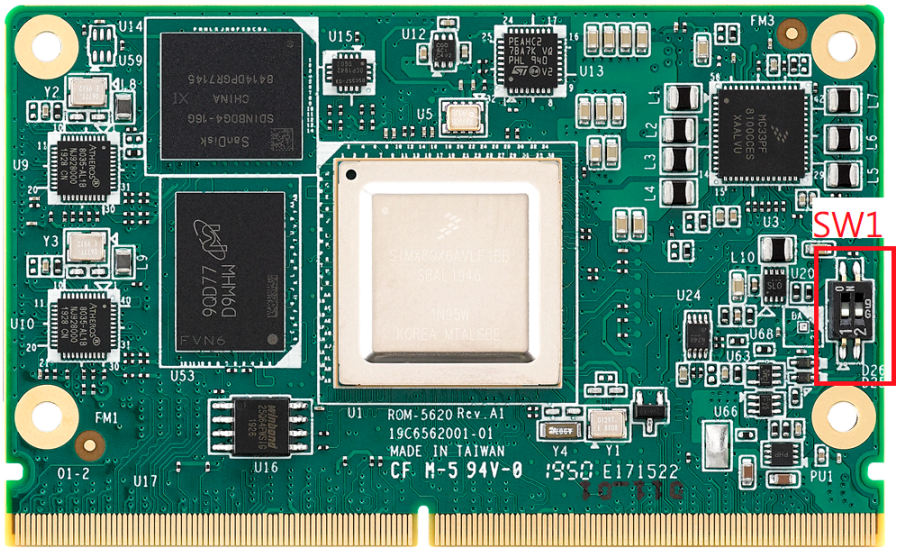
This chapter details mechanical and connector information for the ROM-5620 CPU Computer on Module

Sections include:

- Connector Information
- Block Diagram
- Functions available with ROM-DB5901-SWA1

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) SW1(2)	UART & Debug Port selection AT & ATX mode selection

SW1(1): UART & Debug Port Selection

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

SW1(2): AT/ATX Mode Selection

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

If SW1(1-4) is set to 1-On and reboot, after the uboot message, the COM3 port can be used as normal UART as displayed below:

```
U-Boot 2018.03-5620A1AIM20LIV90064+g5ebc362 (Jan 10 2020 - 17:39:04 +0000)

CPU:   Freescale i.MX8QXP revB A35 at 1200 MHz at 42C
Model: Freescale i.MX8QXP ROM-5620 A1
Board: iMX8QXP MEK
Boot:  SD1
DRAM:  2 GiB
setup_typec lookup gpio@1a_7 failed ret = 3
MMC:   FSL_SDHC: 0, FSL_SDHC: 1
Loading Environment from MMC... *** Warning - bad CRC, using default environment

Failed (-5)
[pcie_ctrlb_sata_phy_init_rc] LNK DOWN 8600000
In:    serial
Out:   serial
Err:   serial

 BuildInfo:
  - SCFW 494c97f3, SECO-FW 92ef1143, IMX-MKIMAGE dd023400, ATF 1cb68fa
  - U-Boot 2018.03-5620A1AIM20LIV90064+g5ebc362

SF: Detected w25q64dw with page size 256 Bytes, erase size 4 KiB, total 8 MiB
eth0 MAC address is invailed !!
Use default MAC adderss:0x00:0x04:0x9F:0x01:0x30:0xE0
eth1 MAC address is invailed !!
Use default MAC adderss:0x00:0x04:0x9F:0x01:0x30:0xE0
switch to partitions #0, OK
mmc1 is current device
flash target is MMC:1
Net:   No ethernet found.
Fastboot: Normal
Normal Boot
Hit any key to stop autoboot:  0
switch to partitions #0, OK
mmc1 is current device

** Unable to read file boot.scr **
24050176 bytes read in 1045 ms (21.9 MiB/s)
Booting from mmc ...
80231 bytes read in 22 ms (3.5 MiB/s)
## Flattened Device Tree blob at 83000000
   Booting using the fdt blob at 0x83000000
   Using Device Tree in place at 0000000083000000, end 0000000083016966
Disable gpt0@5d140000, resource id 207 not owned
/dma-controller@591F0000, 59924
/dma-controller@599F0000, 60812
/dma-controller@5a1f0000, 59048
/dma-controller@5a1f0000, 59048

Starting kernel ...
```

2.2 Block Diagram

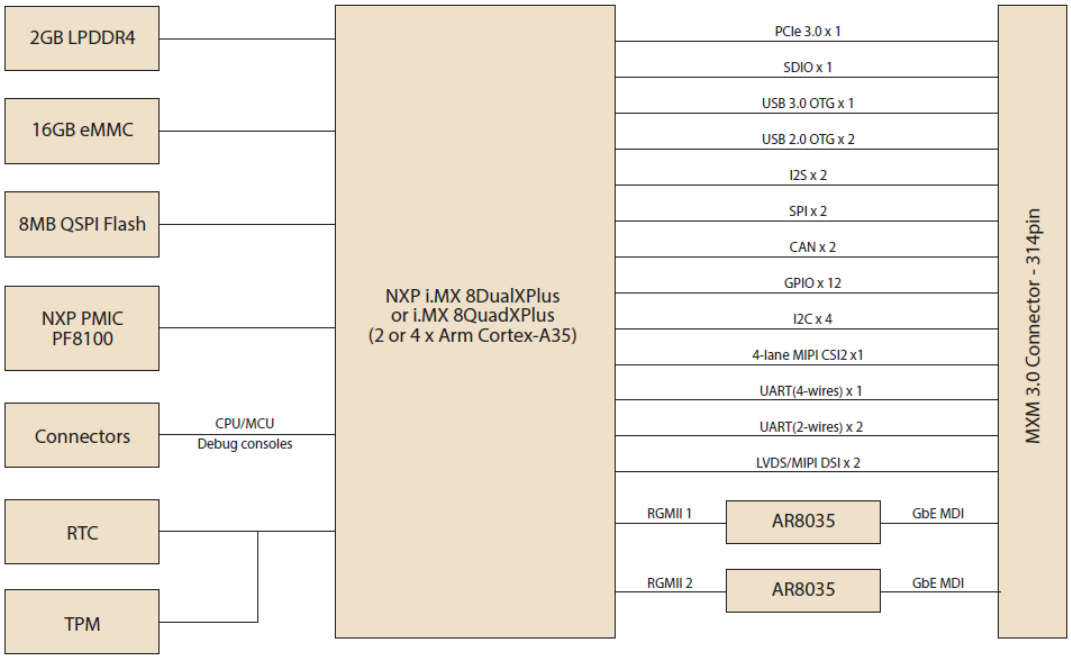
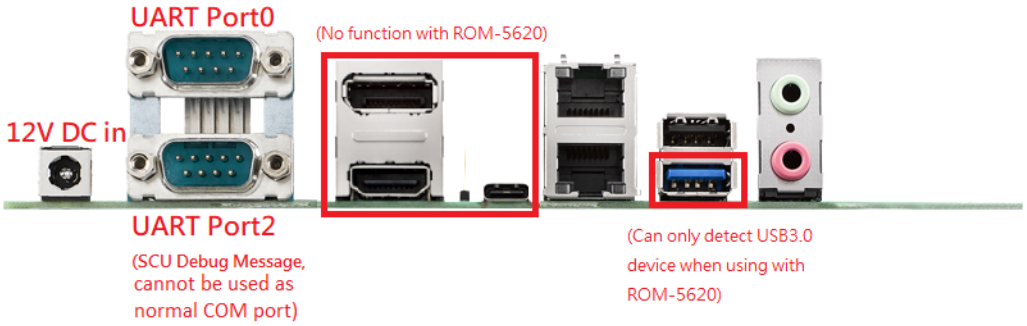
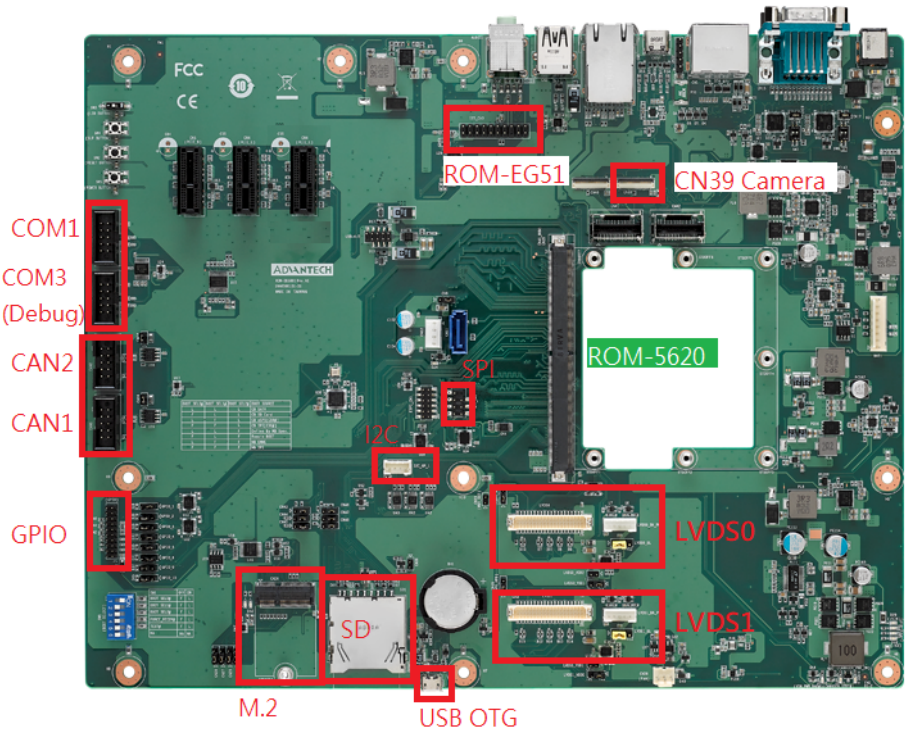


Figure 2.1 ROM-5620 Block Diagram

2.3 Functions Available for ROM-DB5901-SWA1




COM1
COM3
(Debug)
CAN2
CAN1
GPIO
ROM-EG51
CN39 Camera
ROM-5620
SPI
I2C
LVDS0
LVDS1
SD
M.2
USB OTG

Chapter 3

Pin Definition and Quick Start Guide

This chapter details pin definitions and a quick start guide

3.1 Pin Definition

Please refer to the 314 Pin MXM golden finger following SMARC2.0/2.1 standard pin definition detailed below:

Table 3.1: MXM 3.0 Golden Finger

Pin	Signal	Pin	Signal
P1	SMB_ALERT_1V8#	S1	MIPI_CSI0_I2C0_SCL
P2	GND	S2	MIPI_CSI0_I2C0_SDA
P3	MIPI_CSI0_CLK_P	S3	GND
P4	MIPI_CSI0_CLK_N	S4	-
P5	-	S5	-
P6	-	S6	MIPI_CSI0_MCLK_OUT
P7	MIPI_CSI0_DATA0_P	S7	-
P8	MIPI_CSI0_DATA0_N	S8	-
P9	GND	S9	-
P10	MIPI_CSI0_DATA1_P	S10	GND
P11	MIPI_CSI0_DATA1_N	S11	-
P12	GND	S12	-
P13	MIPI_CSI0_DATA2_P	S13	GND
P14	MIPI_CSI0_DATA2_N	S14	-
P15	GND	S15	-
P16	MIPI_CSI0_DATA3_P	S16	GND
P17	MIPI_CSI0_DATA3_N	S17	GBE1_MDI0+
P18	GND	S18	GBE1_MDI0-
P19	GBE0_MDI3-	S19	GBE1_LED_10_100#
P20	GBE0_MDI3+	S20	GBE1_MDI1+
P21	GBE0_LED_10_100#	S21	GBE1_MDI1-
P22	GBE0_LED_1000#	S22	GBE1_LED_1000#
P23	GBE0_MDI2-	S23	GBE1_MDI2+
P24	GBE0_MDI2+	S24	GBE1_MDI2-
P25	GBE0_LED_ACT#	S25	GND
P26	GBE0_MDI1-	S26	GBE1_MDI3+
P27	GBE0_MDI1+	S27	GBE1_MDI3-
P28	-	S28	-
P29	GBE0_MDI0-	S29	-
P30	GBE0_MDI0+	S30	-
P31	SPI3_CS1#	S31	GBE1_LINK_ACT#
P32	GND	S32	-
P33	SDIO_WP	S33	-
P34	SDIO_CMD	S34	GND
P35	SDIO_CD#	S35	-
P36	SDIO_CK	S36	-
P37	SDIO_PWR_EN	S37	-
P38	GND	S38	AUDIO_MCLK
P39	SDIO_D0	S39	SAI1_LRCLK
P40	SDIO_D1	S40	SAI1_SDOUT
P41	SDIO_D2	S41	SAI1_SDIN
P42	SDIO_D3	S42	SAI1_CK

Table 3.1: MXM 3.0 Golden Finger			
P43	SPI3_CS0#	S43	-
P44	SPI3_SCK	S44	-
P45	SPI3_SDI	S45	-
P46	SPI3_SDO	S46	-
P47	GND	S47	GND
P48	-	S48	MIPI_DSI1_I2C0_SCL
P49	-	S49	MIPI_DSI1_I2C0_SDA
P50	GND	S50	SAI0_LRCLK
P51	-	S51	SAI0_SDOUT
P52	-	S52	SAI0_SDIN
P53	GND	S53	SAI0_CK
P54	QSPIA_CS0#	S54	-
P55	QSPIA_CS1#	S55	-
P56	QSPIA_SCLK	S56	QSPIA_D2
P57	QSPIA_D1	S57	QSPIA_D3
P58	QSPIA_D0	S58	QSPIA_RESET#
P59	GND	S59	-
P60	USB0_D+	S60	-
P61	USB0_D-	S61	GND
P62	USB0_OTG_EN_OC#	S62	-
P63	USB0_VBUS_EN	S63	-
P64	USB0_ID	S64	GND
P65	USB1_D+	S65	-
P66	USB1_D-	S66	-
P67	USB1_EN_OC#	S67	GND
P68	GND	S68	-
P69	-	S69	-
P70	-	S70	GND
P71	USB2_EN_OC#	S71	USB2_SSTX_P
P72	-	S72	USB2_SSTX_N
P73	-	S73	GND
P74	-	S74	USB2_SSRX_P
<Key>		S75	USB2_SSRX_N
P75	PCIE_A_RESET#	<Key>	
P76	-	S76	-
P77	-	S77	-
P78	-	S78	-
P79	GND	S79	-
P80	-	S80	GND
P81	-	S81	-
P82	GND	S82	-
P83	PCIE_A_REF_P	S83	GND
P84	PCIE_A_REF_N	S84	-
P85	GND	S85	-
P86	PCIE_A_RX0_P	S86	GND
P87	PCIE_A_RX0_N	S87	-
P88	GND	S88	-

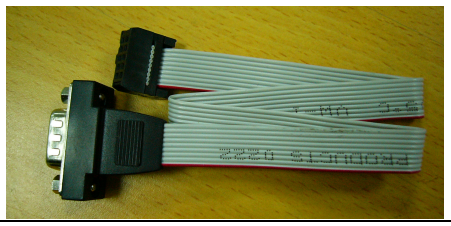
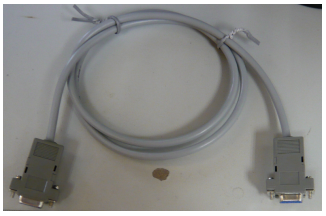
Table 3.1: MXM 3.0 Golden Finger			
P89	PCIE_A_TX0_P	S89	GND
P90	PCIE_A_TX0_N	S90	-
P91	GND	S91	-
P92	-	S92	GND
P93	-	S93	-
P94	GND	S94	-
P95	-	S95	-
P96	-	S96	-
P97	GND	S97	-
P98	-	S98	-
P99	-	S99	-
P100	GND	S100	-
P101	-	S101	GND
P102	-	S102	-
P103	GND	S103	-
P104	-	S104	-
P105	-	S105	-
P106	-	S106	-
P107	-	S107	LCD1_BKLT_EN
P108	GPIO0	S108	MIPI_DSI1_CLK_P
P109	GPIO1	S109	MIPI_DSI1_CLK_N
P110	GPIO2	S110	GND
P111	GPIO3	S111	MIPI_DSI1_DATA0_P
P112	GPIO4	S112	MIPI_DSI1_DATA0_N
P113	GPIO5	S113	-
P114	GPIO6	S114	MIPI_DSI1_DATA1_P
P115	GPIO7	S115	MIPI_DSI1_DATA1_N
P116	GPIO8	S116	LCD1_VDD_EN
P117	GPIO9	S117	MIPI_DSI1_DATA2_P
P118	GPIO10	S118	MIPI_DSI1_DATA2_N
P119	GPIO11	S119	GND
P120	GND	S120	MIPI_DSI1_DATA3_P
P121	M40_I2C0_SCL	S121	MIPI_DSI1_DATA3_N
P122	M40_I2C0_SDA	S122	MIPI_DSI1_PWM
P123	CB_BOOT_SEL0#	S123	-
P124	CB_BOOT_SEL1#	S124	GND
P125	CB_BOOT_SEL2#	S125	MIPI_DSI0_DATA0_P
P126	CB_RESET#	S126	MIPI_DSI0_DATA0_N
P127	RESET_IN#	S127	LCD0_BKLT_EN
P128	POWER_BTN#	S128	MIPI_DSI0_DATA1_P
P129	SER0_UART1_TX	S129	MIPI_DSI0_DATA1_N
P130	SER0_UART1_RX	S130	GND
P131	SER0_UART1_RTS#	S131	MIPI_DSI0_DATA2_P
P132	SER0_UART1_CTS#	S132	MIPI_DSI0_DATA2_N
P133	GND	S133	LCD0_VDD_EN
P134	SER1_UART2_TX	S134	MIPI_DSI0_CLK_P
P135	SER1_UART2_RX	S135	MIPI_DSI0_CLK_N

Table 3.1: MXM 3.0 Golden Finger			
P136	M40_UART_TX	S136	GND
P137	M40_UART_RX	S137	MIPI_DSI0_DATA3_P
P138	-	S138	MIPI_DSI0_DATA3_N
P139	-	S139	MIPI_DSI0_I2C0_SCL
P140	SER3_UART0_TX	S140	MIPI_DSI0_I2C0_SDA
P141	SER3_UART0_RX	S141	MIPI_DSI0_PWM
P142	GND	S142	-
P143	CAN0_TX	S143	GND
P144	CAN0_RX	S144	-
P145	CAN1_TX	S145	WDT_TIME_OUT#
P146	CAN1_RX	S146	PCIE_A_WAKE#
P147	VDD_IN	S147	VDD_RTC
P148	VDD_IN	S148	LID#
P149	VDD_IN	S149	SLEEP#
P150	VDD_IN	S150	VIN_PWR_BAD#
P151	VDD_IN	S151	CHARGER#
P152	VDD_IN	S152	CHARGER_PRSNT#
P153	VDD_IN	S153	CARRIER_STBY#
P154	VDD_IN	S154	CARRIER_PWR_ON
P155	VDD_IN	S155	FORCE_RECOV#
P156	VDD_IN	S156	BATLOW#
-	-	S157	TEST#
-	-	S158	GND

3.2 Quick Start Guide

3.2.1 Debug Port Connection

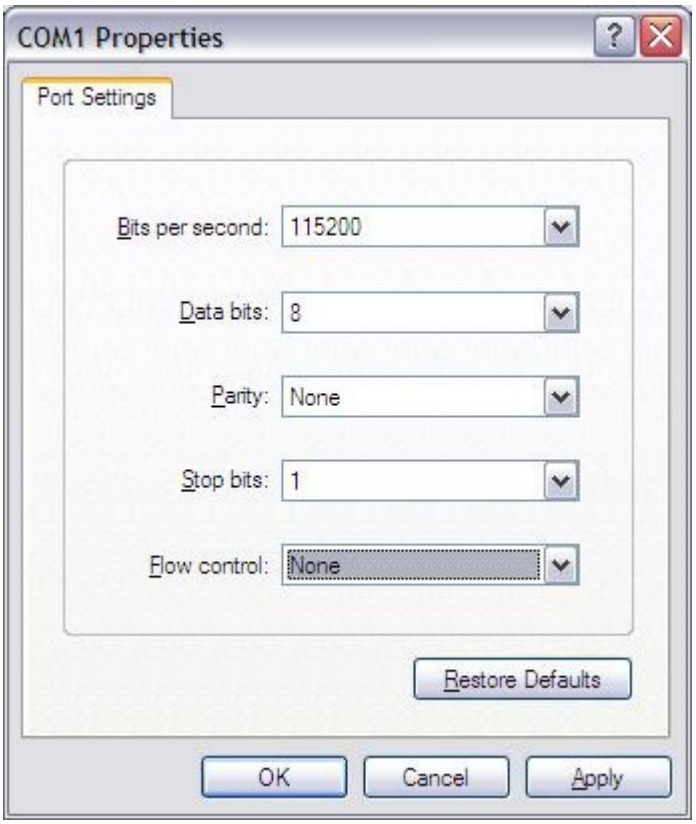
1. Connect debug port cable (1701100300) to debug port (COM3) on ROM-DB5901.
2. Connect it to your PC with RS-232 Cable (1700019474).

Item	P/N	Picture
Debug Port Cable	1701100300	
RS-232 Cable	1700019474	

3.2.2 Debug Port Settings

ROM-5620 can communicate with a host server by using serial cables. Common serial communication programs such as HyperTerminal, Tera Term or PuTTY can be used in this case. The example below describes the serial terminal setup using HyperTerminal on a Windows host:

1. Connect ROM-5620 with your PC by using a serial cable.
2. Open HyperTerminal on your Windows PC, and select the settings as shown in below Photo.



3. Insert power adapter to DC jack and power up the board. The Debug console log will be displayed on the terminal screen.

Chapter 4

Software Functionality

This chapter details the software programs on the ROM-5620 platform

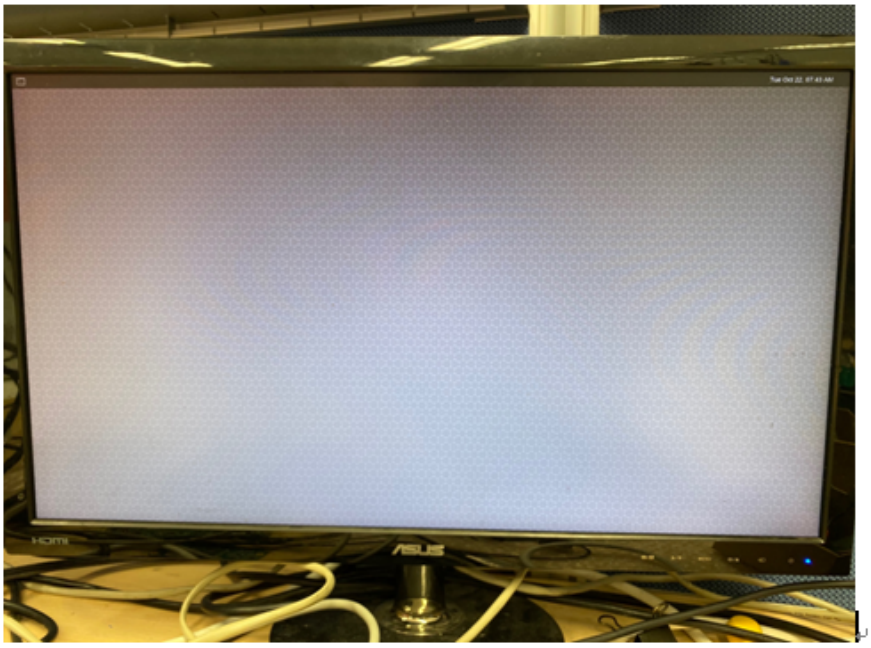
4.1 Test Tools

All test tools must be verified on the ROM-5620 evaluation kit. Please prepare the required test fixtures before verifying each specified I/O. If you have any problems during testing, please contact Advantech for help.

4.1.1 Display Test

4.1.1.1 Single Channel LVDS0 + Single Channel LVDS1 (Default)

The default Weston UI will be displayed on the screen.



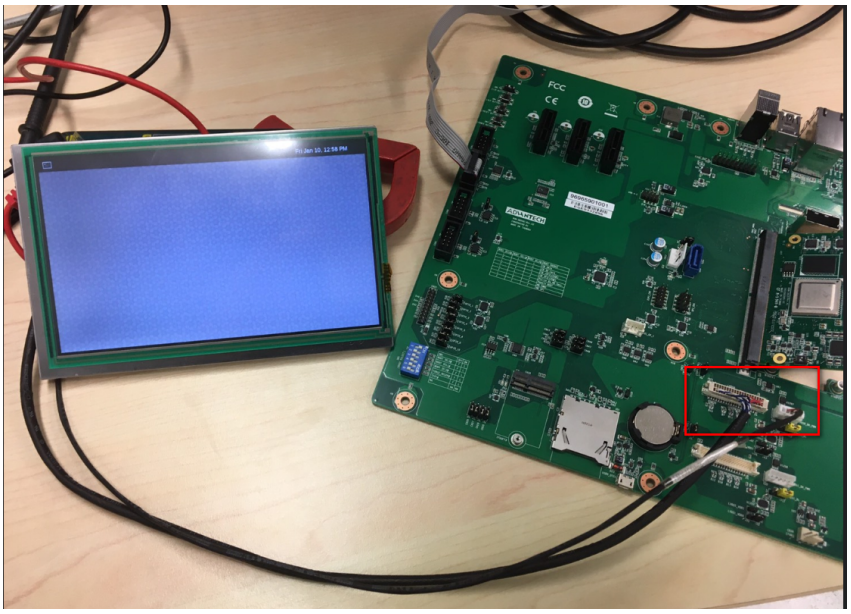
LVDS0 - G070VW01 V0 (VDD: 3.3V, Backlight Power: 12V)

Step 1: Connect 96LEDK-A070WV40NB1 LVDS panel with LVDS cable (1700021883-01) to LVDS0 and Backlight cable (1700021882-01) to LVDS0_BK_PWR.

Step 2: Change LVDS0_VDD1 jumper to (1-2 short), LVDS0_BL jumper to (2-3 short).

Step 3: Power on.

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



4.1.1.2 Dual Channel LVDS

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

Step 1: Connect 96LEDK-A215FH30NF2 LVDS panel with LVDS cable to LVDS0 & LVDS1 and Backlight cable to LVDS1_BK_PWR.

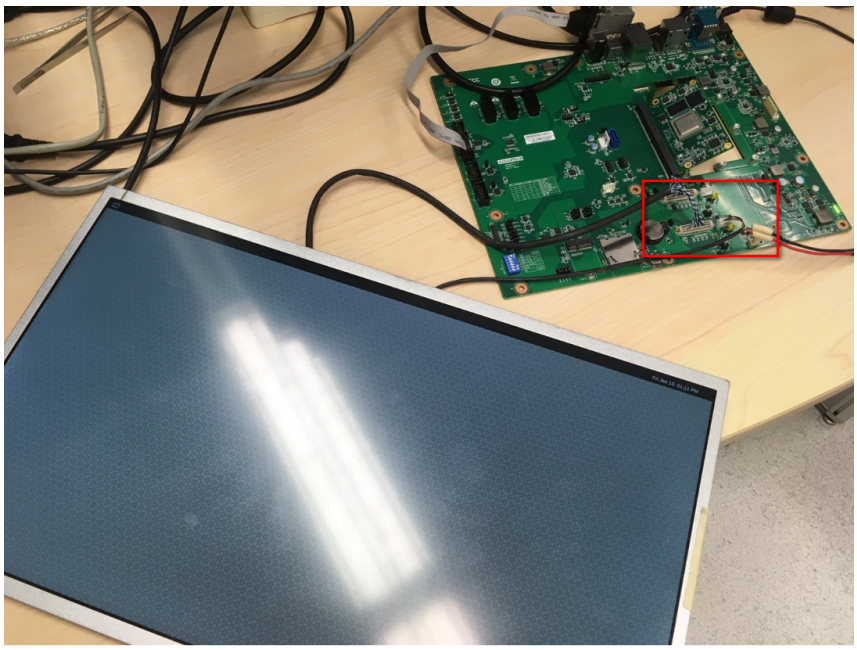
Step 2: Change LVDS0_VDD1 & LVDS1_VDD0 jumper to (2-3 short), LVDS1_BL jumper to (2-3 short).

Step 3: Power on.

Step 4: Press enter after boot, the system will stop at u-boot, run the command below:

```
Normal Boot
Hit any key to stop autoboot:  0
u-boot=>
u-boot=> run lvds_dual
```

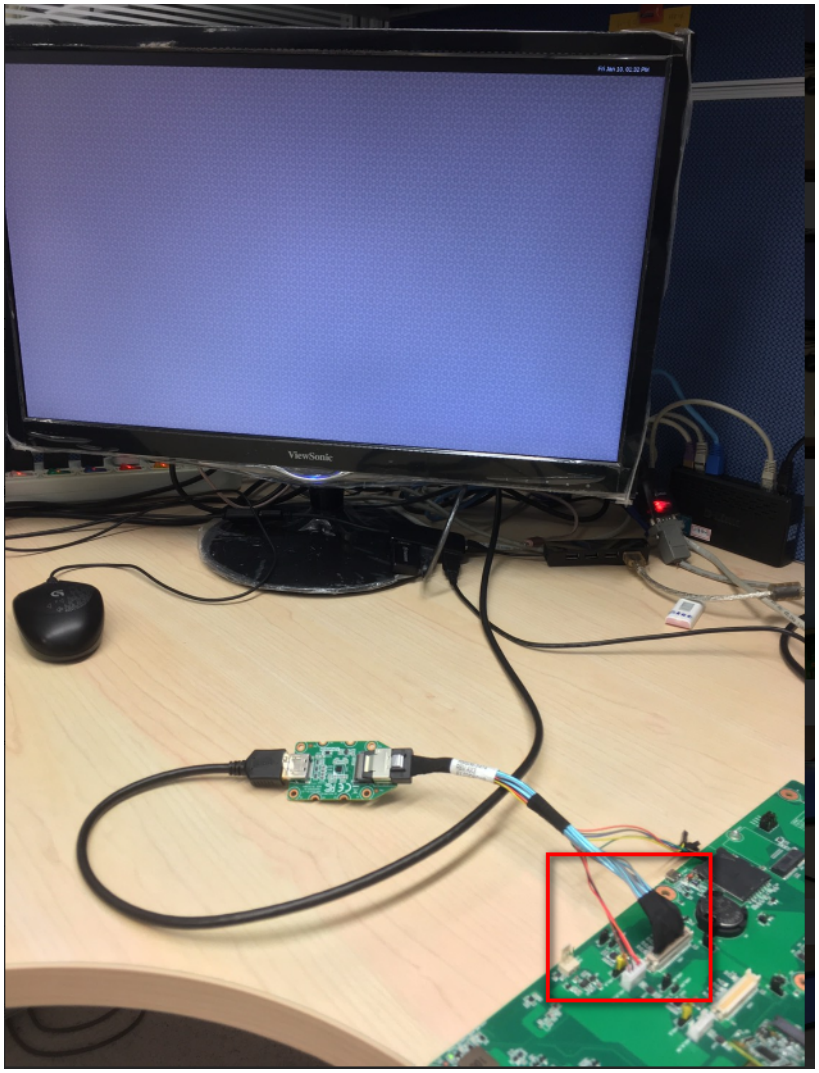
Step 5: Weston UI will be displayed on the screen.



4.1.1.3 MIPI DSI to HDMI with ROM-EG56 on LVDS1

Step 1: Connect ROM-EG56 board with cable (1700030769-01) to LVDS1 and Backlight cable to LVDS1_BK_PWR.

Step 2: Change LVDS1_VDD0 jumper to (1-2 short), LVDS1_BL jumper to (1-2 short).



Step 3: Power on. (Please note that ROM-EG56 IC is extremely sensitive, only plug/unplug it while the DC+12V is unplugged)

Step 4: Press enter after boot, system will stop at u-boot, run the command below:

```
Normal Boot
Hit any key to stop autoboot:  0
u-boot=>
u-boot=> run hdmi_bridge
```

Step 5: Weston UI will be displayed on the screen.

4.1.1.4 Test Different Resolutions:

Step 1: Disable Weston UI:

```
# systemctl stop weston
```

Step 2: Get the “connect ID” and the “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
```

Step 3: Play colorbar of the specified resolution on HDMI.

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

4.1.2 Audio Test

Step 1: Connect ROM-EG51 to I2S_CN3, connect MIC and headphone.

Step 2: Power on and check Audio Codec (SGTL5000):

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

```
# 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]
```

Step 3: 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 4G: (EWM-C117FL06E - USB)

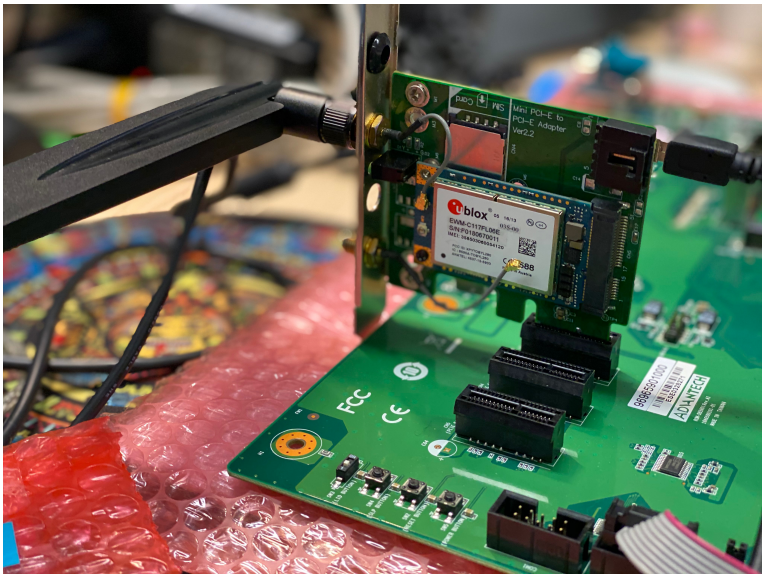
Step 1: Connect EWM-C117FL06E to Mini PCIE slot on 9680015491 and connect the card to CN6 PCIe_D slot on ROM-DB5901.

Step 2: Connect the antenna 1750007990-01 to the SMA (F) connector on 9680015491
and connect the IPEX connector to MT1 on EWM-C117FL06E module.

Step 3: Connect the Mini USB cable from 9680015491 to USB 2.0 Type A port on ROM-DB5901.

Step 4: Power on and execute the pppd command to connect to the network.

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



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 UART Test

ROM-5620 (i.MX8X)	ROM-DB5901 Carrier Board COM Port Name
/dev/ttyLP0	COM3 (Default as Debug Console, 2-wire, can be used as normal UART by SW1 setting on ROM-5620)
/dev/ttyLP1	COM0 or M.2 (by CN27,CN28, CN29, CN30 jumper setting, 4-wire)
/dev/ttyLP2	COM1 (2-wire)
-	COM2 (2-wire, for SCU message only)

A. RS-232 Test:

Loopback Test (eg. ttyLP1)

UART 1: Change SW7 jumper to switch modes. (1ON 2OFF: RS-232)

UART 1: Change CN27~CN30 jumper to (1-2 short)

```
#stty -F /dev/ttyLP1 -echo -onlcr 115200
#cat /dev/ttyLP1 &
#echo test > /dev/ttyLP1
```

B. RS-422 & RS-485 Test:

Change SW7 jumper to switch modes: (1ON 2ON: RS-422, 1OFF 2 ON: RS-485)

Change CN27~CN30 jumper to (1-2 short)

Test RS-485 with RS-485 device or ADAM-4520.

```
#./enable485 /dev/ttyLP1
#stty -F /dev/ttyLP1 speed 115200 ignbrk -brkint -icrnl -imaxbel -opost -
onlcr -isig -icanon -iexten -echo -echoe -echok -echoctl -echoke
#cat /dev/ttyLP1 &
#echo test > /dev/ttyLP1
```

4.1.6 I²C Test

Check I²C Device (audio codec: 3-000a)

```
root@imx8qxprom5620a1:~# i2cdetect -y 3
     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@imx8qxprom5620a1:~# i2cset -f -y 3 0x0a 0 0xff00 w
root@imx8qxprom5620a1:~# i2cget -f -y 3 0x0a 0 w
0x11a0
```

4.1.7 USB Test

USB(2.0/3.0) disk test

After inserting the USB disk into 2.0 or 3.0 port: (Please note that with ROM-5620, USB3.0 port on ROM-DB5901 coastline can only recognize USB 3.0 devices. It cannot recognize USB 2.0 only devices)

```
root@imx8qxprom5620a1:~# lsusb -t
/:  Bus 02. Port 1: Dev 1, Class=root_hub, Driver=/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=/1p, 480M
    |__ Port 1: Dev 2, If 0, Class=Hub, Driver=hub/2p, 480M
        |__ Port 1: Dev 3, If 0, Class=Mass Storage, Driver=usb-storage,
480M
root@imx8qxprom5620a1:~#
```

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
```

4.1.8 RTC Test

Disable RTC sync service

```
root@imx8qxprom5620a1 : ~#  systemctl  stop  systemd-timesyncd
root@imx8qxprom5620a1 : ~#  systemctl  stop  ntpdate . service
```

Set system time to current, then set RTC

```
root@imx8qxprom5620a1 : ~#  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@imx8qxprom5620a1 : ~#  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@imx8qxprom5620a1 : ~#  hwclock -s  &&  date
Web Feb 17  10:45:10  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 the Ethernet device with “ifconfig”

```
root@imx8qxprom5620a1:~# 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 : 04 : 9f : 01 : 30 : e0
          inet addr : 172 . 22 . 28. 48  Bcast : 172 . 22 . 31. 255
Mask:255.255.252.0
          inet6 addr : fe80 : : 204 : 9fff : fe01 : 30e0/64  Scope: Link
          UP BROADCAST MULTICAST DYNAMIC MTU : 1500 Metric : 1
          RX packets : 68 errors : 0 dropped : 9 overruns: 0 frame : 0
          TX packets : 64 errors : 0 dropped : 0 overruns: 0 carrier : 0
          Collisions : 0 txqueuelen : 1000
          RX bytes : 8013 (7.8 KiB) TX bytes: 9576 (9.3 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@imx8qxrom5620a1:~# ping -I eth1 8 . 8 . 8 . 8
PING 8 . 8 . 8 . 8 (8 . 8 . 8 . 8) from 172 . 22 . 28 . 48 eth1: 56 (84) bytes
of data.
64 bytes from 8 . 8 . 8 . 8: icmp_seq=1 tt1=54 time=3.36 ms
64 bytes from 8 . 8 . 8 . 8: icmp_seq=2 tt1=54 time=3.15 ms
64 bytes from 8 . 8 . 8 . 8: icmp_seq=3 tt1=54 time=3.18 ms
^C
- - - 8 . 8 . 8 . 8 ping statistics - - -
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 3.157 / 3.235 / 3.363 / 0.091 ms
root@imx8qxrom5620a1:~#
```

4.1.11 GPIO Test

GPIO pin

SMARC Pin #	SMARC Pin Name	CPU Ball Name	Number	Default Direction
P108	GPIO0 / CAM0_PWR#	SC_P_SPI2_CS0_LSIO_GPIO1_IO00	448	In
P109	GPIO1 / CAM1_PWR#	SC_P_SPI2_SCK_LSIO_G-PIO1_IO03	451	In
P110	GPIO2 / CAM0_RST#	SC_P_SPI2_SDI_LSIO_GPIO1_IO02	450	In
P111	GPIO3 / CAM1_RST#	SC_P_SPI2_SDO_LSIO_G-PIO1_IO01	449	In
P112	GPIO4 / HAD_RST#	SC_P_SPI0_CS0_LSIO_GPIO1_IO08	456	In
P113	GPIO5 / PWM_OUT	SC_P_SPI0_SCK_LSIO_G-PIO1_IO04	452	In
P114	GPIO6 / TACHIN	SC_P_SPI0_SDI_LSIO_GPIO1_IO05	453	In
P115	GPIO7	SC_P_MCLK_IN0_LSIO_G-PIO0_IO19	499	In
P116	GPIO8	SC_P_SPI0_SDO_LSIO_G-PIO1_IO06	454	In
P117	GPIO9	SC_P_CSI_PCLK_LSIO_G-PIO3_IO00	384	In
P118	GPIO10	SC_P_CSI_MCLK_LSIO_G-PIO3_IO01	385	In
P119	GPIO11	SC_P_CSI_EN_LSIO_GPIO3_IO02	386	In

Loop-back Test (Take GPIO4 and GPIO5 as examples)

Step 1: Connect GPIO4 and GPIO5

Step 2: Export GPIO interface

```
root@imx8qxprom5620a1 : ~#  echo  456  >  /sys/class/gpio/export
root@imx8qxprom5620a1 : ~#  echo  452  >  /sys/class/gpio/export
```

Step 3: Set direction

```
root@imx8qxprom5620a1 : ~#  echo  out  >  /sys/class/gpio/gpio1/direction
root@imx8qxprom5620a1 : ~#  echo  in  >  /sys/class/gpio/gpio2/direction
```

Step 4: Read value and set output value then check

```
root@imx8qxprom5620a1 : ~#  cat  /sys/class/gpio/gpio2/value
0
root@imx8qxprom5620a1 : ~#  echo  1  >  /sys/class/gpio/gpio1/value
root@imx8qxprom5620a1 : ~#  cat  /sys/class/gpio/gpio2/value
1
```

4.1.12 Watchdog Test

System will reboot after 1 sec

```
root@imx8qxprom5620a1 : ~# /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: ioct1)
Trying to set time out value=1 seconds

Uboot 2018.03-5620A1AIM20LIV90064+g5ebc362 (Jan 10 2020 - 17:39:04 +0000)

CPU:     Freescale i.MX8QXP revB A35 at 1200 MHz at 33C
Model: Freescale i.MX8QXP ROM-5620 A1
```

4.1.13 Camera Test

Please connect MIPI-CSI2 camera (OV5640) to CN39 FPC connector.

Preview

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

Capture

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

4.1.14 CANbus Test

Step 1: Connect CAN0_D+ to CAN1_D+ and CAN0_D- to CAN1_D-

Step 2: Set CAN0 and CAN1 up

```
root@imx8qxprom5620a1:~# ip link set can0 up type can bitrate 125000
[  314.402318] IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
root@imx8qxprom5620a1:~# ifconfig can0 up
root@imx8qxprom5620a1:~# ip link set can1 up type can bitrate 125000
[  322.355701] IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
root@imx8qxprom5620a1:~# ifconfig can1 up
```

Step 3: candump can0

```
root@imx8qxprom5620a1:~# candump can0 &
[1] 3909
```

Step 4: cansend can1

```
root@imx8qxprom5620a1:~# cansend can1 1F334455#1122334455667788
root@imx8qxprom5620a1:~#       can0   1F334455     [8]  11 22 33 44 55 66 77
88
```

4.1.15 TPM Test

Using the “tpm_test.bin” to test, please connect to your Advantech contact window for the test tool.

```
root@imx8qxprom5620a1:~# cp /run/media/sda1/tpm_test.bin .
root@imx8qxprom5620a1:~# ls
tpm_test.bin
root@imx8qxprom5620a1:~# ./tpm_test.bin
[TPM Command]
80010000000C000001440000
[TPM Response]
80010000000A00000100

[TPM Command]
80010000000B0000014301
[TPM Response]
80010000000A00000000

[TPM Command]
8001000000160000017A00000060000010500000001
[TPM Response]
800010000001B00000000100000006000000010000010553544D20

[TPM Command]
8001000000160000017A000000010B00000002
[TPM Response]
800010000002300000000010000000600000002000010B004900410000010C44A01A17
```

Chapter 5

Embedded OS

This chapter introduces Linux systems instructions

5.1 Introduction

ROM-5620 platform is preloaded with the Yocto 2.5 based embedded O.S. (Linux kernel starting from 4.14.98). It contains all system-required shell commands and drivers for the ROM-5620 platform. Advantech does not offer an IDE developing environment in ROM-5620 BSP. Users can evaluate and develop environments using Ubuntu 16.04 LTS.

The purpose of this chapter is to introduce users to software configuration for ROM-5620 to enable efficient application(s) development.

"For detailed operation, please refer to Yocto Linux BSP Ver.9 User Guide for iMX8 series form Wiki page:

http://ess-wiki.advantech.com.tw/view/IoTGateway/BSP/Linux/iMX8/Yocto_L-BV9_User_Guide

5.1.1 Device Tree Source File Select for ROM-5620

5.1.1.1 Display

A. LVDS

1. g070vw01

adv-imx8mxp-rom5620-a1.dtb

2. g150xgel05

adv-imx8qxp-rom5620-a1-lvds-chimei.dtb

3. g215hvn01

adv-imx8qxp-rom5620-a1-lvds-dual.dtb

B. LVDS to HDMI

adv-imx8qxp-rom5620-a1-hdmi-bridge.dtb

C. DSI to HDMI

adv-imx8qxp-rom5620-a1-hdmi-bridge.dtb

D. DSI

1. auog101uan02

adv-imx8qxp-rom5620-a1-auog101uan02.dtb

5.1.1.2 M.2 SDIO

Adjust CN43~CN48

adv-imx8qxp-rom5620-a1-m2-sdio.dtb

5.1.1.3 2nd QSPI

adv-imx8qxp-rom5620-a1-qspi-b.dtb

Chapter 6

System Recovery

This chapter details system recovery for damaged Linux os

6.1 System Recovery

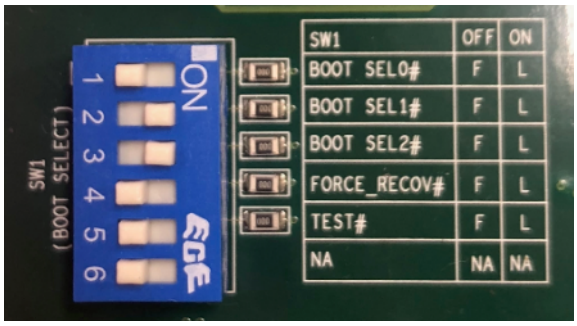
This section provides detailed procedures for restoring the eMMC image. If users destroy the on-board flash image by accident, they can recover the system by following these steps.

6.1.1 Recovery by SD Card

1. Copy 5620A1AIM20LIV90064_iMX8X_flash_tool.tgz package to your desktop
2. Insert SD card to PC
3. Make a bootable SD card

```
# tar zxvf 5620A1AIM20LIV90064_iMX8X_flash_tool.tgz
# cd 5620A1AIM20LIV90064_iMX8X_flash_tool/mk_inand/
# sudo ./mksd-linux.sh /dev/sdg
```

4. Insert SD card and copy 5620A1AIM20LIV90064_iMX8X_flash_tool to USB disk
5. Insert USB disk and SD card then boot the whole system from SD card by changing SW1 on ROM-DB5901 to 1OFF, 2-3ON, 4-6OFF as demonstrated in the following photo

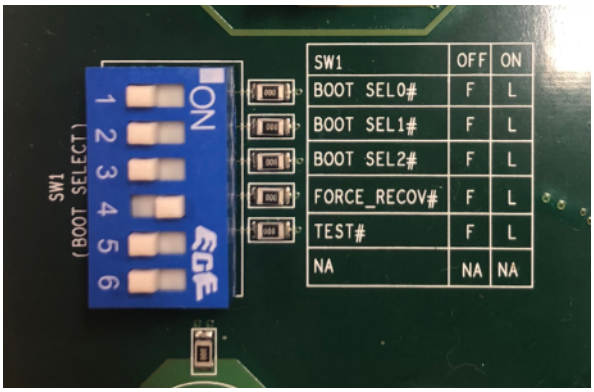


6. Enter USB disk folder, make a bootable eMMC

```
# cd /run/media/sda1/
# cd 5620A1AIM20LIV90064_iMX8X_flash_tool/mk_inand/
# sudo ./mksd-linux.sh /dev/mmcblk0
```

6.1.2 Recovery by UUU Tool

1. Download UUU tool from (https://github.com/ADVANTECH-Corp/uuu/releases/tag/v20191101)
2. Create a folder with the files below:
   1) UUU
   2) imx-boot-imx8qxprom5620a1-sd.bin-flash
   3) fsl-image-validation-imx-imx8qxprom5620a1-20200110174717.rootfs.sdcard
3. Set the correct boot mode on ROM-DB5901 SW1 with 4ON, turn every other pin OFF, then power the system on.



4. Connect the PC OTG cable (1700023619-01) f to ROM-DB5901 USB_OTG1.
   Perform the following command:

```
sudo ./uuu -b emmc_all_adv imx-boot-imx8qxprom5620a1-sd.bin-flash fsl-image-validation-imx-imx8qxprom5620a1-20200110174717.rootfs.sdcard
```

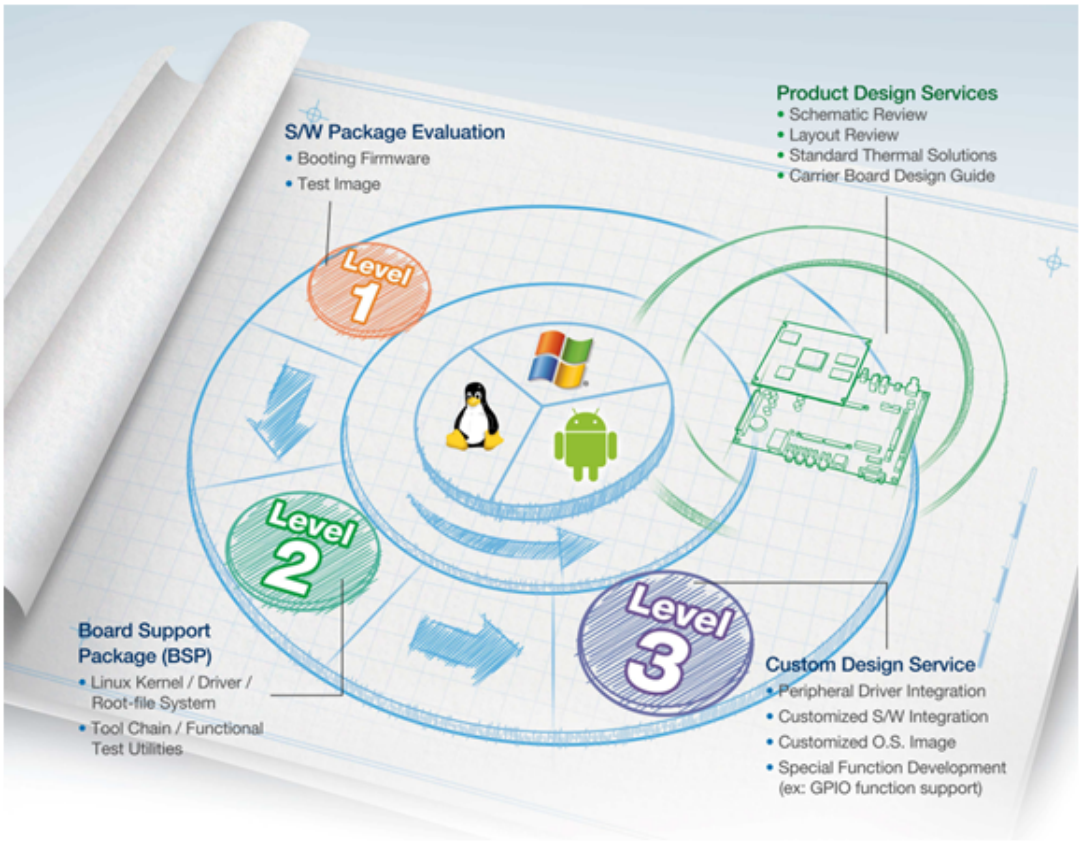
5. UUU tool will start recovery image to eMMC.
6. For more usage, please use the link below:
   http://ess-wiki.advantech.com.tw/view/IoTGateway/BSP/Linux/iMX8/Yocto_L-BV9_User_Guide#System_Recovery

Chapter 7

Advantech Services

This chapter details Advantech's Design-In serviceability, technical support, and warranty policy for the ROM-5620 evaluation kit

7.1 RISC Design-In Services



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

Easy Development

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

- Full range of RISC products
- Comprehensive document support

Design Assistance Service

Advantech provides a checklist for engineers to check their schematics and review services based on customer carrier board schematics. These services prevent design errors before they occur. This saves time and reduces costs associated with developing carrier boards.

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

Thermal Solution Services

In order to provide quicker flexible solutions for customer's thermal designs, Advantech provides services including both modularized thermal solutions and customized thermal solutions

- Standard thermal solutions
- Customized thermal solutions

Embedded Software Services

This service provides support drivers, software integration and customized firmware, root file-system, and Linux image. Users can 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, the lack of expertise and experience in general power and I/O design can cause challenges; especially when integrating CPU modules into carrier boards.

The Acquisition of Information

Despite obtaining sufficient information for making decisions concerning specialized vertical applications, some customers encounter difficulties dealing with platform design, communicating with the CPU, or chipset manufacturers. These challenges in carrier board design can negatively impact the 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 development. 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.

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 WiFi, 3G, 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 RTX2.0, 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 a third party 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 a certain amount of time on 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 regarding further testing and equipment usage. This helps customers find the right tools to efficiently identify and solve problems to enhance product quality and performance.

7.2 Contact Information

The contact information for Advantech customer service is below:

Region/Country	Contact Information
United States of 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 a quick response once the form is completed:

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

7.3 Technical Support and Assistance

7.3.1 Warranty Policy

The warranty policy for Advantech products is below:

7.3.1.1 Warranty Period

Advantech branded off-the-shelf products and third party off-the-shelf products used to assemble 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 carry a 15 month regional warranty service by default. 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.

7.3.1.2 Repairs Under Warranty

It is possible to obtain a replacement (Cross-Shipment) during the first 30 days of the purchase. Contact your original Advantech supplier to organize returns for Dead on Arrival products (if the products were purchased directly from Advantech). The DOA Cross-Shipment excludes any damage incurred during shipping as well as customized and/or built-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 refurbished products from AAdvantech back to customers' sites will be Advantech's expense.

7.3.1.3 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 lighting strike, flood, earthquake, etc.
- Product updates/upgrades and tests upon the request of customers who are without warranty.

7.3.2 Repair Process

7.3.2.1 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.

7.3.2.2 Returning Products for Repair

It's possible for customers 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 the local repair center before using global repair services.

Customers should send cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as CPU, DRAM, and CF Card. If you return these parts (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” to the shipment invoice.
3. Show RMA numbers, product serial numbers, and warranty status on the shipment invoices.
4. Add information about the goods Country of origin.
   In addition, please attach an invoice with RMA number to the box, then write the RMA number on the outside of the box and attach the packing slip to save handling time. Please 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 items at the customer's cost if inappropriately packed.

"Door-to-Door" transportation such as speed post is recommended for delivery. 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.

7.3.2.3 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 suffered a failure for which AAdvantech is not responsible —whether by accident or other cause. Such conditions will be determined by Advantech at its discretion.
- The product is damaged beyond repair due to a natural disaster such as a lighting 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 for which Advantech is not responsible whether by accident or other cause.

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

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

7.3.2.4 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.

7.3.2.5 Custody of Products Submitted for Repair

Advantech will retain custody of a product submitted for repair for one month while it is waiting the 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.

7.3.2.6 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 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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