

User Manual

EPC-R3720

NXP i.MX 8M Plus Edge AI Box
Computer

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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. Products 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.

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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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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 the equipment.
 - The equipment has been exposed to moisture.
 - The equipment is malfunctioning or does not operate according to the user manual.
 - The equipment has been dropped and damaged.
 - The equipment shows obvious signs of breakage.

DISCLAIMER: 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.

Packing List

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

- 1 x EPC-R3720 Box computer
- 1 x China ROHS
- 2 x wall mount
- 4 x screw for wall mount

Optional Accessories

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

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

Ordering Information

Part No.	Description
EPC-R3720IQ-ALA100	NXP i.MX 8M Plus Edge AI Box Computer (UIO-4030)
EPC-R3720IQ-ALA120	NXP i.MX 8M Plus Edge AI Box Computer (UIO-4032)
EPC-R3720IQ-ALA140	NXP i.MX 8M Plus Edge AI Box Computer (UIO-4034)
EPC-R3720IQ-ALA160	NXP i.MX 8M Plus Edge AI Box Computer (UIO-4036)

Contents

Chapter 1

General Introduction

This chapter details background information on the EPC-R3720.

Sections include:

- Introduction
- Specifications

1.1 Introduction

EPC-R3720 is an ARM® Cortex®-A53 i.MX8MPlus-based secured, compact-sized, low-power consumed Edge AI Box, best for your Edge AI Inference with Neural Network Accelerator up to 2.3 TOPS, HDR-Capable ISP of 375 MPixels/s, with a wide range of I/O extension and oriented for industrial automation.

1.2 Product Features

1.2.1 Specification

Module Name	EPC-R3720		
Processor	SOC	NXP i.MX 8M Plus	
	Spec.	Quad Core Cortex-A53 1.6 GHz	
Memory	Technology	LPDDR4 4000MT/s	
	Capacity	Onboard 6G	
	Flash	16GB eMMC	
Ethernet	Chipset	NXP i.MX 8M Plus Integrated RGMII	
	Speed	2 x 10/100/1000Mbps	
Watch Dog Timer	Yes		
RTC	Yes		
I/O (Front)	HDMI	1 x HDMI 2.0, up to 3840 x 2160 at 30Hz	
	LAN	2 x RJ45	
I/O (Rear)	USB	1 x USB2.0 Type A, 1 x USB 3.2 Gen 1 by 1 Type A	
	COM	2 x 2-wire RS-232 with UIO-4032/ UIO-4034 1 x RS-435, 1 x RS-232 with UIO-4030	
	LAN	1 x 10/100/1000 Mbps with UIO-4032 4 x 10/100/1000 Mbps with UIO-4036 (Hub)	
	USB	2 x USB2.0 with UIO-4032	
	CAN bus	1 x CAN bus 2.0 A/B with UIO-4034	
	GPIO	4 x DIs, 4 x DOs with UIO-4030	
	Expansion	Mini-PCIE	1 x Full-size mini PCIe slot (USB signal only)
		M.2	1 x M.2 2230 Key E slot (PCIe/USB/SDIO/UART/I2S)
SIM slot		1 x Nano SIM slot	
SD socket		1 x Micro SD slot	
LED system indicators	1 x Green LED for system power		
	1 x Blue Programmable LED		

Button		1 x Reset button
Power	Power supply	12V
	Power Type	Lockable DC-Jack as default
	Consumption	Max 9.2W@12V
SW	OS	Yocto / Android
Mounting		Wall mount / Din Rail (Optional)
Environment	Operating Temp.	-40 ~ 70 °C
	Storage Temp.	-40 ~ 85 °C
	Operating Humidity	5% ~ 95% Relative Humidity, non-condensing
Certification		CE/FCC/CCC/BSMI Class B

1.3 Mechanical Specifications

- **Dimension:** 152 x 108 x 38 mm
- **Reference Weight:** 0.85 kg (including whole package)



1.4 Electrical Specifications

- **Power supply type:** DC-in 12 V.
- **RTC Battery:**
 - Typical voltage: 3 V
 - Normal discharge capacity: 210 mAh

1.5 Environmental Specifications

- **Operating temperature:** -40 ~ 70 °C
- **Operating humidity:** 5% ~ 95% relative humidity, non-condensing
- **Storage temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Storage humidity:** 60 °C/140 °F @ 95% RH Non-condensing

Chapter 2

H/W Installation

This chapter details mechanical and connector information for the EPC-R3720.

Sections include:

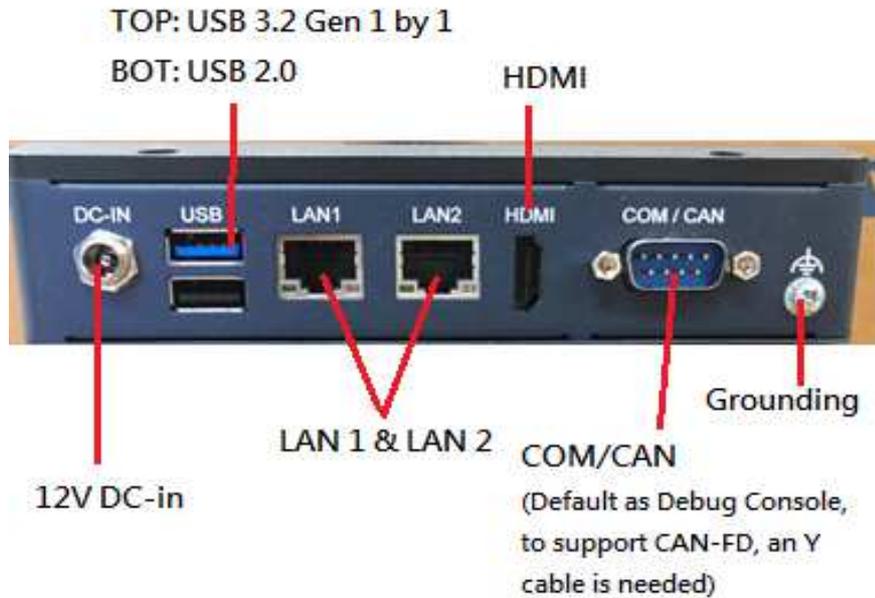
- Connector Information
- Mechanical Diagrams
- Quick Start Guide

2.1 Introduction

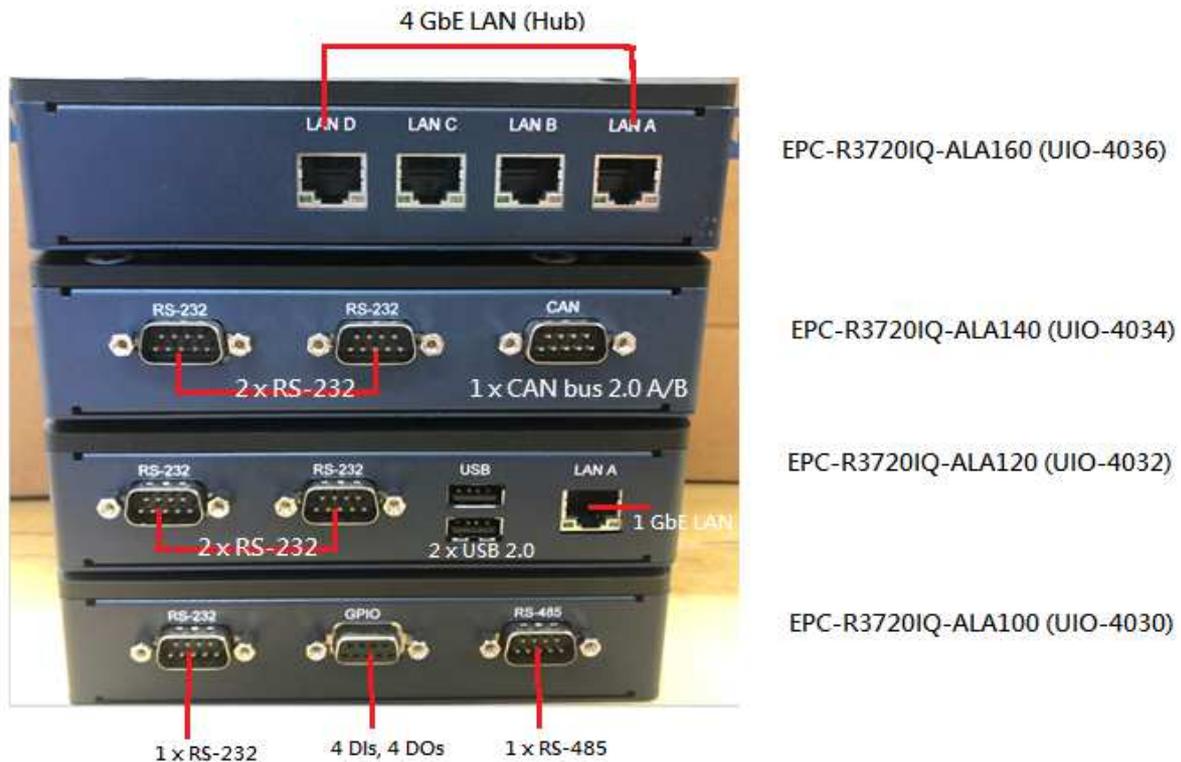
The following sections show the external connectors and pin assignments.

2.2 EPC-R3720 I/O Overview

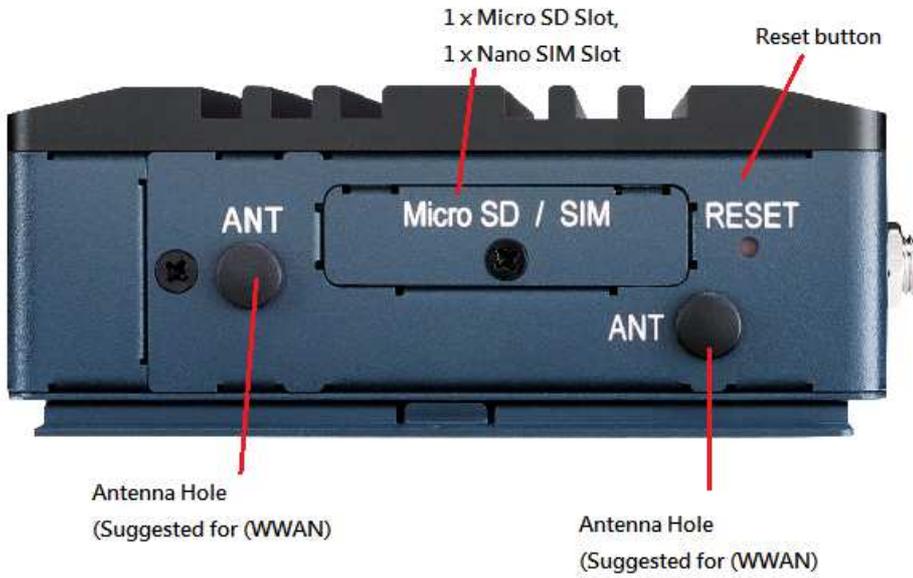
■ Front I/O:



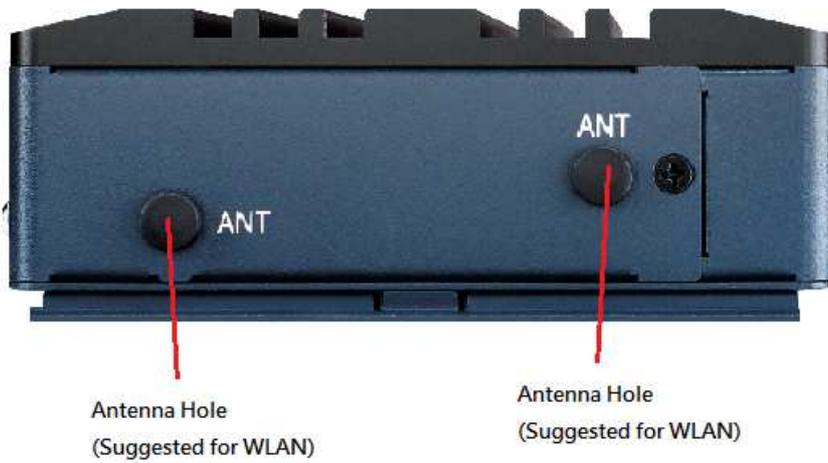
■ Rear I/O:



■ **Left Side:**



■ **Right Side:**



2.3 EPC-R3720 Front Side Connectors

2.3.1 DC Power Jack (DC-IN)

EPC-R3720 supports a lockable DC-jack header that can be connected 12V DC external power input.



DC-IN:			
Pin	Pin Name	Pin	Pin Name
1	+12V	2	GND
3	GND	-	-

2.3.2 USB Ports

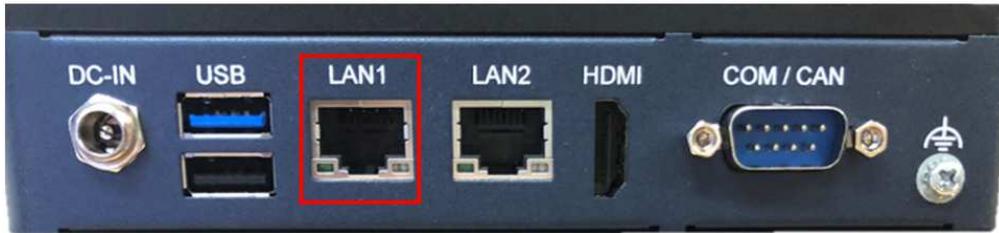
EPC-R3720 supports 1 x USB3.2 Gen 1 by 1 Type A port and 1 x USB 2.0 Type A port on the front side, which are Host.



USB5 & USB6:			
Pin	Pin Name	Pin	Pin Name
1	+VBUS_USB5	2	USB5_D-
3	USB5_D+	4	GND
5	USB5_SSRX-	6	USB5_SSRX+
7	GND	8	USB5_SSTX-
9	USB5_SSTX+	10	+VBUS_USB6
11	USB6_D-	12	USB6_D+
13	GND	-	-
H1	GND	H2	GND
H3	GND	H4	GND

2.3.3 LAN Ports

EPC-R3720 supports 2 x 10/100/1000Mbps LAN ports on the front side.



LAN1:			
Pin	Pin Name	Pin	Pin Name
1	LAN1_MDIO+	2	LAN1_MDIO-
3	LAN1_MDII+	4	LAN1_MDII-
5	GND	6	GND
7	LAN1_MDI2+	8	LAN1_MDI2-
9	LAN1_MDI3+	10	LAN1_MDI3-
11	LAN1_ACT#	12	+2.5V_VDDH1
13	LAN1_LED_1000#	14	LAN1_LED_10_100#



LAN2:			
Pin	Pin Name	Pin	Pin Name
1	LAN0_MDIO+	2	LAN0_MDIO-
3	LAN0_MDI1+	4	LAN0_MDI1-
5	GND	6	GND
7	LAN0_MDI2+	8	LAN0_MDI2-
9	LAN0_MDI3+	10	LAN0_MDI3-
11	LAN0_ACT#	12	+2.5V_VDDH0
13	LAN0_LED_1000#	14	LAN0_LED_10_100#

2.3.4 HDMI

EPC-R3720 supports 1 HDMI 2.0, for up to 3840 x 2160 resolution at 30Hz.



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

2.3.5 COM / CAN

EPC-R3720 supports 1 x DB9 port at the front side which is default used as debug console, but can be configured as RS-232/RS-422/RS-485, and also with 1 x CAN-FD signal.



COM/CAN:				
Pin	RS-232 (Default used as Debug Console)	RS-422	RS-485	CAN-FD
1	COM_DCD	RS-422_TXD-	RS-485_D-	-
2	COM_RXD	RS-422_TXD+	RS_485_D+	-
3	COM_TXD	RS-422_RXD+	-	-
4	COM_DTR	RS-422_RXD-	-	-
5	GND	GND	GND	-
6	-	-	-	CAN1_H
7	COM_RTS	-	-	-
8	COM_CTS	-	-	-
9	-	-	-	CAN1_L

2.4 Quick Start Guide

2.4.1 Debug Port Connection

EPC-R3720 Debug port is on the front side at COM / CAN, please connect RS-232 female to female cable 1700019474 to your USB-to-RS232 Cable to your PC terminal.

Note: Debug cable needs to be purchased separately.

Part No.	Description	Photo
1700019474	RS-232 Cable DB9 female to DB9 female	

2.4.2 Debug Port Setting

EPC-R3720 can communicate with a host servers using serial cables. Common serial communication programs such as HyperTerminal, Tera Term, or PuTTY can be used in these cases. The following example describes the serial terminal setup using HyperTerminal on a Windows host:

1. Connect EPC-R3720 with your PC by using a serial cable.
2. Open HyperTerminal on your Windows PC, and select the settings as shown in below Figure 2-1.
3. When switching on the power, the green LED indicator on TOP side of the board will be lit up to indicate that the EPC-R3720 box Computer has booted up normally. (Figure 2.2)

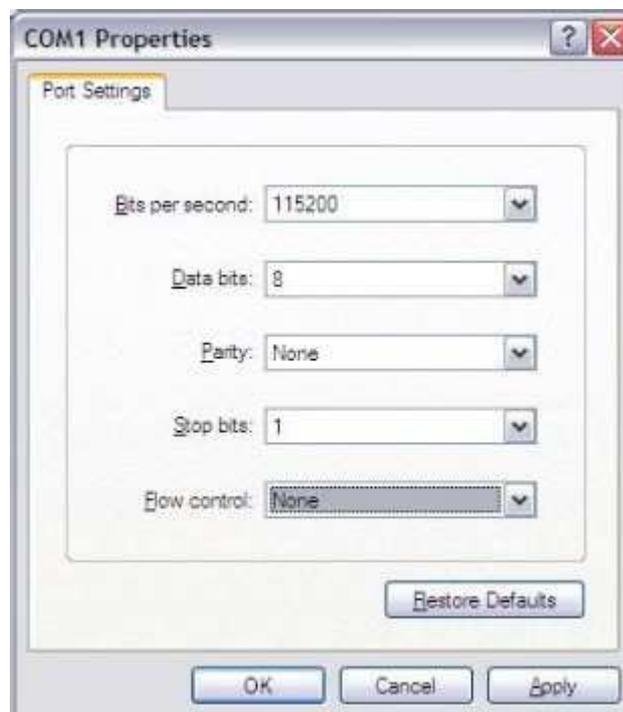


Figure 2.1 HyperTerminal Settings for Terminal Setup



Figure 2.2 Power LED Indicator

Chapter 3

Software Functionality

This chapter details software functions on RSB-3720.

3.1 Display

3.1.1 HDMI

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

3.1.1.1 Test Different Resolutions:

Step 1: Disable Weston UI

```
# killall -9 weston UI
```

Step 2: Get “connect ID” and “support resolutions

```
# modetest -c
```

```
id  encoder status  name      size (mm)  modes  encoders
46  45   connected  HDMI-A-1  510x290   8      45
modes:
  name refresh (Hz) hdisp hss hse htot vdisp vss vse vtot)
1920x1080 60 1920 2008 2052 2200 1080 1084 1089 1125 148500 flags: phsync, pvsync; type: preferred, driver
1920x1080 50 1920 2448 2492 2640 1080 1084 1089 1125 148500 flags: phsync, pvsync; type: driver
1280x720 60 1280 1390 1430 1650 720 725 730 750 74250 flags: phsync, pvsync; type: driver
1280x720 50 1280 1720 1760 1980 720 725 730 750 74250 flags: phsync, pvsync; type: driver
1440x576 50 1440 1464 1592 1728 576 581 586 625 54000 flags: nhsync, nvsync; type: driver
1440x480 60 1440 1472 1596 1716 480 489 495 525 54000 flags: nhsync, nvsync; type: driver
720x576 50 720 732 796 864 576 581 586 625 27000 flags: nhsync, nvsync; type: driver
720x480 60 720 736 798 858 480 489 495 525 27000 flags: nhsync, nvsync; type: driver
props:
```

Step 3: Play colorbar of the specified resolution on HDMI

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

3.1.2 LVDS

3.1.2.1 Single Channel LVDS (Single LVDS0 or Single LVDS1)

LVDS0- Panel: G070VW01V0 (VDD: 3.3V, Backlight Power: 12V)

Step 1: Connect 96LEDK-A070WV40NB1 LVDS panel with LVDS cable (1700021883-01) to LVDS and Backlight cable (1700032155-01) to BL1.

Step 2: Change VDD1 jumper to (1-2 short), BLP1 jumper to (2-3 short).

Step 3: Power on.

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

```
Normal Boot
Hit any key to stop autoboot: 0
u-boot=>
u-boot=> setenv fdt_file imx8mp-rsb3720-a1-lvds0-auo.dtb; boot
```

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



LVDS1- Panel: G070VW01V0 (VDD: 3.3V, Backlight Power: 12V)

Step 1: Connect 96LEDK-A070WV40NB1 LVDS panel with LVDS cable (1700021883-01) to LVDS and Backlight cable (1700032155-01) to BL2.

Step 2: Change VDD1 jumper to (1-2 short), BLP2 jumper to (2-3 short).

Step 3: Power on.

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

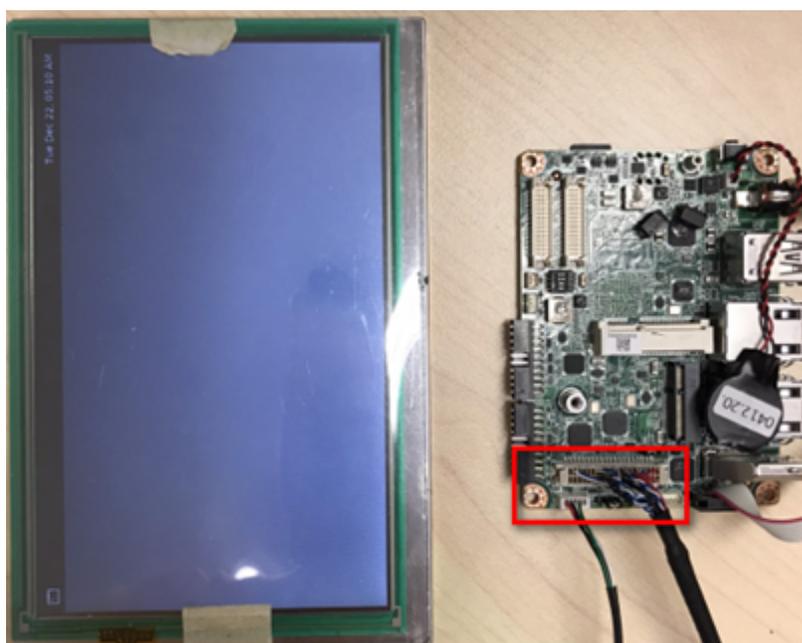
Normal Boot

Hit any key to stop autoboot: 0

u-boot=>

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

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



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

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

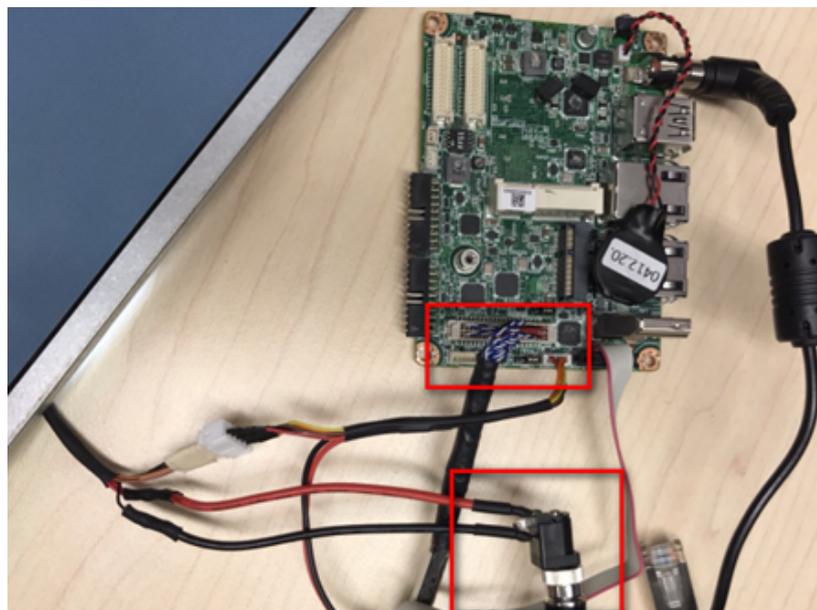
Step 2: Change VDD1 jumper to (2-3 short), BLP1 jumper to (2-3 short).

Step 3: Connect another 12V adapter to the DC-Jack on Backlight cable.

Step 4: Power on RSB-3720 and the extra 12V adapter.

Step 5: Press enter after boot, system will stop at u-boot as below, issue the commend in red and press enter.

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



3.2 Audio

Step 1: Check audio codec

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

Step 2: Audio codec (sgtl5000):

1. Set MIC and headphone:

```
# amixer set Mic 32%
Simple mixer control 'Mic',0
  Capabilities: volume volume-joined
  Playback channels: Mono
  Capture channels: Mono
  Limits: 0 - 3
  Mono: 1 [33%] [20.00dB]
#amixer set Lineout 100%
Simple mixer control 'Lineout',0
  Capabilities: pvolume
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 31
  Mono:
  Front Left: Playback 31 [100%] [0.00dB]
  Front Right: Playback 31 [100%] [0.00dB]
amixer set PCM 100%
Simple mixer control 'PCM',0
  Capabilities: pvolume
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 192
  Mono:
  Front Left: Playback 192 [100%]
  Front Right: Playback 192 [100%]
```

2. Record and playback:

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

3.3 Mini-PCIE

Test 3G/4G with EWM-C117FL06E Module

Step 1: Connect the PCIE card to Mini PCIE slot.



Step 2: Execute the pppd command to connect the network.

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

3.4 M.2

3.4.1 Test Wifi with EWM-W163M201E Module (PCIe Interface)

```
# 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
```

3.4.2 Test Bluetooth with EWM-W163M201E Module (USB Interface)

```
$ 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
```

3.5 Serial Port

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

3.5.1 RS-232 Loopback Test (eg. ttymxc1)

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

3.5.2 RS-422 Test

Step 1: First change the debug console port to UART2 (UIO-4032 COM_3), or use telnet to login to system console to issue command for com port test.

```
u-boot=>
u-boot=> editenv console
edit: ttymxc1,115200
```

Step 2: Set both GPIO#496, GPIO#497, set as 1, 1 for RS-422.

```
# echo 496 > /sys/class/gpio/export
# echo 497 > /sys/class/gpio/export
# echo out > /sys/class/gpio/gpio1/direction
# echo out > /sys/class/gpio/gpio2/direction
# echo 1 > /sys/class/gpio/gpio1/value
# echo 1 > /sys/class/gpio/gpio2/value
```

Step 3: Test RS-422 with Adam-4520. Connect Adam-4520 with COM1 with 1700100250 DB9 as the following:

Adam-4520 RX- <--> DB9 Pin 1, Adam-4520 RX+ <-->DB9 Pin 2, Adam-4520 TX- <-->DB9 Pin 4, Adam-4520 TX+ <--> DB9 Pin 3

```
# stty -F /dev/ttymxc2 speed 115200 ignbrk -brkint -icml -imaxbel -opost -onlcr -isig -icanon -
iexten -echo -echoe -echok -echoctl -echoke
# cat /dev/ttymxc2 &
# echo "Serial Test" > /dev/ttymxc2
```

3.5.3 RS-485 Test

Step 1: Set GPIO#496, GPIO#497 Set to 0,1

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

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

```
#!/enable485 /dev/ttymx2
#stty -F /dev/ttyLP1 speed 115200 ignbrk -brkint -icrnl -imaxbel -opost -onlcr -isig -icanon -
iexten -echo -echoe -echok -echoctl -echoke
#cat /dev/ttymx2 &
#echo test > /dev/ttymx2
```

3.6 I²C

Step 1: Check i²c device(audio codec : 0-000a)

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

Step 2: I²c set and get

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

3.7 USB

USB disk test (USB2.0/ USB3.2 Gen 1 By 1 port)

Step 1: After inserting usb disk to USB 2.0 port or USB 3.2 Gen 1 By 1 port, issue the below command (lsusb -t) to check if the USB device is listed.

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

Step 2: Test (eg. if usb disk is /dev/sda)

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

3.8 RTC

Step 1: Disable rtc sync service

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

Step 2: Set system time to current, then write to RTC

```
root@imx8mprsb3720a1:~# date 021710452016 && hwclock -w && date
Wed Feb 17 10:45:00 UTC 2016
Wed Feb 17 10:45:01 UTC 2016
```

Step 3: Set one incorrect time, then read time from RTC to verify

```
root@imx8mprsb3720a1:~# date 010100002000 && hwclock -r && date
Sat Jan 1 00:00:00 UTC 2000
2016-02-17 10:45:06.361513+00:00
Sat Jan 1 00:00:00 UTC 2000
```

Step 4: Restore the RTC time to system time

```
root@imx8mprsb3720a1:~# hwclock -s && date
Wed Feb 17 10:45:13 UTC 2016
```

3.9 eMMC/SD/SPI flash

3.9.1 Device Routes

eMMC: /dev/mmcblk2
SD: /dev/mmcblk1
QSPI1: /dev/mtd0

3.9.1.1 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
```

3.10 Ethernet

Step 1: Check Ethernet device

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

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

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

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

Step 2: Connect cable and ping test (eg. Eth0)

```
root@imx8mprsb3720a1:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=115 time=3.42 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=115 time=3.44 ms
^C
--- 8.8.8.8 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 3.419/3.431/3.443/0.012 ms
root@imx8mprsb3720a1:~#
```

3.11 GPIO

3.11.1 GPIO Pins

Table 3.1: UIO Extension 1 (UIO1)

Pin	Numbers
GPIO2	501
GPIO4	503

Table 3.2: UIO Extension 2 (UIO2)

Pin	Numbers
GPIO5	504
GPIO6	505
GPIO7	506
GPIO8	507
GPIO9	508
GPIO10	509
GPIO11	139
GPIO12	138

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

Step 1: Connect GPIO2 and GPIO4

Step 2: Export GPIO interface

```
root@imx8mprsb3720a1:~# echo 501 > /sys/class/gpio/export
root@imx8mprsb3720a1:~# echo 503 > /sys/class/gpio/export
```

Step 3: Set GPIO direction

```
root@imx8mprsb3720a1:~# echo out > /sys/class/gpio/gpio1/direction
root@imx8mprsb3720a1:~# echo in > /sys/class/gpio/gpio2/direction
```

Step 4: Read value and set output value than check

```
root@imx8mprsb3720a1:~# cat /sys/class/gpio/gpio2/value
0
root@imx8mprsb3720a1:~# echo 1 > /sys/class/gpio/gpio1/value
root@imx8mprsb3720a1:~# cat /sys/class/gpio/gpio2/value
1
```

3.12 Watchdog

3.12.1 System will reboot after 1 sec

```
root@imx8mpsb3720a1:~# /unit_tests/Watchdog/wdt_driver_test.out 1 2 0
---- Running < /unit_tests/Watchdog/wdt_driver_test.out > test ----
Starting wdt_driver (timeout: 1, sleep: 2, test: ioctl)
Trying to set timeout value=1 seconds
The actual timeout was set to 10 seconds
Now reading back -- The timeout is 10 seconds

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

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

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

3.13.1.1 Preview

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

3.13.1.2 Capture

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

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

3.13.2.1 Preview

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

3.13.2.2 Capture

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

3.13.3 MIPI-CSI0 (Tested with Basler daA3840-30mc Camera)

Step 1: Connect the Basler camera to the mini-SAS to MIPI-CSI Cable, connect the mini-SAS cable to the ROM-EG55 board, and then connect the other side to Basler daA3840-30mc Camera



Step 2: Connect the ROM-EG56 (DSI to HDMI Converter board).

Step 3: Press enter after boot, system will stop at u-boot as below:

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

3.13.3.1 Preview

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

3.13.3.2 Capture

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

3.14 CANBus or CAN-FD

(Please note that the CAN function on RSB-3720 COM1 Pin Header is CANBus only with RSB-3720CQ & RSB-3720CD, RSB-3720 COM1 Pin Header is CANB-FD only with RSB-3720WQ & RSB-3720WD)

Step 1: Connect the UIO-4034 A101-2 CANbus port Pin 2 and Pin 7 to RSB-3720 COM1 with 1700100250 cable, pin 9 and Pin 6 of the DB9.

Step 2: Set CAN0 and CAN1 up.

```
root@imx8mprsb3720a1:~# ip link set can0 up type can bitrate 125000
[ 1362.935162] IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
root@imx8mprsb3720a1:~# ifconfig can0 up
root@imx8mprsb3720a1:~# ip link set can1 up type can bitrate 125000
[ 1381.546624] IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
root@imx8mprsb3720a1:~# ifconfig can1 up
```

Step 3: candump CAN0

```
root@imx8mprsb3720a1:~# candump can0 &
[1] 965
```

Step 4: candump CAN1

```
root@imx8mprsb3720a1:~# cansend can1 1F334455#1122334455667788
root@imx8mprsb3720a1:~# can0 1F334455 [8] 11 22 33 44 55 66 77 88
```

3.15 TPM

Please use tpm_test.bin to test.

```
root@imx8mprsb3720a1:~# cp /run/media/sda1/tpm_test.bin .
root@imx8mprsb3720a1:~# ls
tpm_test.bin
root@imx8mprsb3720a1:~# ./tpm_test.bin
[TPM Command]
8001000000C000001440000
[TPM Response]
8001000000A00000100

[TPM Command]
8001000000B0000014301
[TPM Response]
8001000000A00000000

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

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

3.16 LED

3.16.1 LED ON/OFF test

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

3.17 EEPROM

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

3.18 UIO Extension Boards

3.18.1 UIO-4030

1	UART	2-wire RS-232 (UIO Extension_UIO2: COM2) UIO-4030 COM_3 /dev/ttymx1
2	GPIO	4 DI & 4 DO Pins (UIO Extension_UIO2) input pin#5: gpio 504 input pin#9: gpio 508 output pin#6: gpio 505 output pin#10: gpio 509 input pin#7: gpio 506 input pin#11: gpio 139 output pin#8: gpio 507 output pin#12: gpio 138
3	RS-485	1. Test RS-485 with Adam-4520. Adam-4520 Pin Data- and Pin Data+ connect to UIO-4030 COM_4 Pin 1 and Pin 2. # stty -F /dev/ttyUSB0 speed 115200 ignbrk -brkint -icrnl -imaxbel -opost -onlcr -isig -icanon -iexten -echo -echoe -echok -echoctl -echoke # cat /dev/ttyUSB0 & # echo "Serial Test" > /dev/ttyUSB0
4	EEPROM	# echo -n '\$\x06\x05\x04\x03\x02\x01' > test # dd if=test of=/sys/bus/i2c/devices/3-0050/eeprom # hexdump -C /sys/bus/i2c/devices/3-0050/eeprom -n 64

3.18.2 UIO-4032

1	UART	<p>2-wire RS-232 (UIO Extension_UIO2: COM2) UIO-4032 COM_3 /dev/ttymx1</p> <hr/> <p>2-wire RS-232 (UIO Extension_UIO2: COM4) UIO-4032 COM_4 /dev/ttymx3 # stty -F /dev/ttymx3 -echo -onlcr 115200 # cat /dev/ttymx3 & # echo "Serial Port Test" > /dev/ttymx3</p> <p>Can also be used as M7_Debug Port: M7_Debug: (1) emmc boot: U-Boot > fatload mmc 2:1 0x48000000 imx8mp_m7_TC-M_hello_world.bin;cp.b 0x48000000 0x7e0000 20000; U-Boot > bootaux 0x7e0000 (2) sd card boot: U-Boot > fatload mmc 1:1 0x48000000 imx8mp_m7_TC-M_hello_world.bin;cp.b 0x48000000 0x7e0000 20000; U-Boot > bootaux 0x7e0000</p>
2	USB	<p>TOP: USB1</p> <hr/> <p>BOT: USB2</p>
3	Ethernet	<p>1. Check IP & DHCP 2. Throughput # iperf3 -c 192.168.0.2 -t 60 -i 10</p>
4	EEPROM	<p># echo -n "\$\x06\x05\x04\x03\x02\x01" > test # dd if=test of=/sys/bus/i2c/devices/3-0050/eeprom # hexdump -C /sys/bus/i2c/devices/3-0050/eeprom -n 64</p>

3.18.3 UIO-4034

1	UART	<p>2-wire RS-232 (UIO Extension_UIO2: COM2) Same as UIO-4032 COM_3</p> <hr/> <p>2-wire RS-232 (UIO Extension_UIO2: COM4) Same as UIO-4032 COM_4</p>
2	CAN Bus	<p>Connect the UIO-4034 A101-2 CANbus port Pin 2 and Pin 7 to RSB-3720 COM1 with 1700100250 cable, pin 9 and Pin 6 of the DB9. # ip link set can0 up type can bitrate 125000 # ifconfig can0 up # ip link set can1 up type can bitrate 125000 # ifconfig can1 up</p> <p># candump can0 & # cansend can1 1F334455#1122334455667788</p>
3	EEPROM	<p># echo -n "\$\x06\x05\x04\x03\x02\x01" > test # dd if=test of=/sys/bus/i2c/devices/3-0050/eeprom # hexdump -C /sys/bus/i2c/devices/3-0050/eeprom -n 64</p>

3.18.4 UIO-4036

1	Lan Switch	1. Check IP & DHCP 2. Ping IP 3. Throughput # iperf3 -c 192.168.0.2 -t 60 -i 10
2	EEPROM	# echo -n \$'\x06\x05\x04\x03\x02\x01' > test # dd if=test of=/sys/bus/i2c/devices/3-0050/eeprom # hexdump -C /sys/bus/i2c/devices/3-0050/eeprom -n 64

3.19 PyelQ Test

The i.MX 8M Plus family focuses on neural processing unit (NPU) and vision system, advance multimedia, and industrial automation with high reliability.

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

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

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

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

For more examples and how to run PyelQ demos on RSB-3720, please refer to the below page:

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

3.19.1 Run Applications and Demos

3.19.1.1 Applications

Application Name	Framework	i.MX Board	BSP Release	Inference Core	Status
Switch Classification Image	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	CPU, GPU, NPU	PASS
Switch Detection Video	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	CPU, GPU, NPU	PASS

3.19.1.2 Demos

Demo Name	Framework	i.MX Board	BSP Release	Inference Core	Status
Object Classification	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Object Detection SSD	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Object Detection YOLOv3	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Object Detection DNN	OpenCV:4.2.0	RSB-3720	5.4.24_2.1.0	CPU	PASS
Facial Expression Detection	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Fire Classification	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Fire Classification	ArmNN:19.08	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Pose Detection	TFLite:2.1.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS
Face/Eyes Detection	OpenCV:4.2.0	RSB-3720	5.4.24_2.1.0	GPU, NPU	PASS

Chapter 4

Embedded O.S

This chapter introduces how to build Linux systems

4.1 Introduction

RSB-3720 platform is preloaded with Yocto 3.0 based embedded O.S. (Linux kernel starting from 5.4.24 to 5.4.70.) It contains all system-required shell commands and drivers ready for the RSB-3720 platform. We do not offer IDE developing environment in RSB-3720 BSP, users can evaluate and develop under Ubuntu 16.04 LTS environment.

The purpose of this chapter is to introduce software configuration and development of RSB-3720 to you, so that you can develop your own application(s) efficiently.

For detailed operation, please refer to Yocto Linux BSP Ver.A User Guide for iMX8 series from Wiki page: http://ess-wiki.advantech.com.tw/view/loTGateway/BSP/Linux/iMX8/Yocto_LBVA_User_Guide

4.1.1 Device Tree Source File Select for RSB-3720

4.1.1.1 Display

A. HDMI (Default)

imx8mp-rsb3720-a1.dtb

B. LVDS

1. g070vw01(LVDS0) + HDMI

imx8mp-rsb3720-a1-lvds0-auo.dtb

2. g070vw01(LVDS1) + HDMI

imx8mp-rsb3720-a1-lvds1-auo.dtb

3. g215hvn01(DUAL LVDS) + HDMI

imx8mp-rsb3720-a1-lvds-dual.dtb

C. MIPI-DSI

1. ROM-EG56 (DSI to HDMI Converter Board) + HDMI

imx8mp-rsb3720-a1-adv7535.dtb

2. auog101uan02(DSI) + HDMI

imx8mp-rsb3720-a1-auog101uan02.dtb

4.1.1.2 Camera

1. OV5640 (default)

imx8mp-rsb3720-a1.dtb

2. Basler daA3840-30mc Camera

imx8mp-rsb3720-a1-basler.dtb

Chapter 5

System Recovery

This chapter details system recovery for damaged Linux OS.

5.1 System Recovery

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

5.1.1 Recovery by SD Card

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

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

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

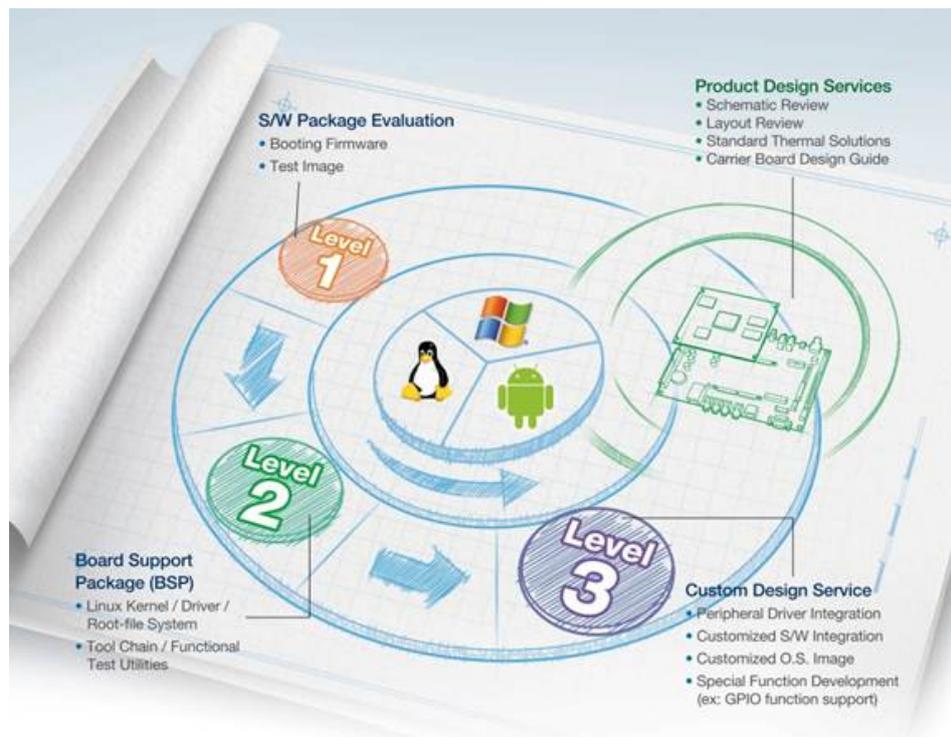
```
# cd /run/media/sda1/
# cd 3720A1AIM30LIVA0070_iMX8MP_flash_tool/mk_inand/
# sudo ./mksd-linux.sh /dev/mmcblk2
```

Chapter 6

Advantech Services

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

6.1 RISC Design-In Services



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

Easy Development

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

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

Design Assistance Service

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

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

Thermal Solution Services

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

- Standard thermal solutions
- Customized thermal solutions

Embedded Software Services

Supports driver, software integration or customized firmware, root file-system and Linux image. Customer can save lot of time and focus on their core development.

- Embedded Linux/ Android OS
- Advantech boot loader Customization

With the spread of industrial computing, a whole range of new applications have been developed, resulting in a fundamental change in the IPC industry. In the past system integrators (SI) were used to completing projects without outside assistance but now such working models have moved on. Due to diverse market demands and intense competition, cooperation for (both upstream and downstream) vertical integration has become a much more effective way to create competitive advantages. As a result, ARM-based CPU modules were born out of this trend. Concentrating all necessary components on the CPU module and placing other parts on the carrier board in response to market requirements for specialization, provides greater flexibility while retaining its low power consumption credentials.

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

General I/O Design Capability

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

Data Acquisition

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

Software Development and Modification

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

To address this issue, Advantech proposed the concept of streamlined Design-In support services for RISC-based computer-on modules (COMs). With a dedicated design-in services team, Advantech actively participates in carrier board design and

problem solving. Our services not only enable customers to effectively distribute their resources, but also reduce R&D costs and hardware investment.

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

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

Planning Stage

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process, including product features, specification, and compatibility testing with software. Advantech offers a RISC customer solution board (CSB) as an evaluation tool for carrier boards, which are simultaneously designed during the development of RISC COMs. During the planning stage, customers can use the CSB evaluation board to assess RISC modules and test peripheral hardware. Moreover, Advantech provides standard software BSPs for RISC COMs to allow customers to define the product specifications and verify I/O and performance. We not only offer hardware planning and technology consultations, but also software evaluations and recommendations regarding peripheral modules (such as Wi-Fi, 3G, and Bluetooth modules). Resolving customer concerns is Advantech's main target at this stage. Because product evaluation is the key task in the planning stage, especially regarding performance and specifications, we try to help our customers conduct all the necessary tests for their RISC COM.

Design Stage

When a product moves into the design stage, Advantech will supply a carrier board design guide for reference. The carrier board design guide provides pin definitions of the COM connector with limitations and recommendations for carrier board design. This gives customers a clear guideline to follow during carrier board development. Regarding different form factors, Advantech offers a complete pin-out checklist for different form factors, such as Q7, ULP, and RTX2.0, to enable customers to examine the carrier board signals and layout design accordingly. In addition, our team is able to assist customers with reviewing the placement/layout and schematics to ensure the carrier board design meets all their requirements. For software development, Advantech's RISC software team can assist customers with establishing an environment for software development and evaluating the time and resources required. If customers outsource software development to a third party, Advantech can also cooperate with the third party and provide consultation services. With Advantech's expert support, the design process becomes much easier and the product quality is enhanced to meet all customer criteria.

Integration Stage

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

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

Validation Stage

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

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

6.2 Contact Information

Region/Country	Contact Information
America	1-888-576-9688
Brazil	0800-770-5355
Mexico	01-800-467-2415
Europe (toll free)	00800-2426-8080
Singapore & SAP	65-64421000
Malaysia	1800-88-1809
Australia (toll free)	1300-308-531
China (toll free)	800-810-0345 800-810-8389 Sales@advantech.com.cn
India (toll free)	1-800-425-5071
Japan (toll free)	0800-500-1055
Korea (toll free)	080-363-9494 080-363-9495
Taiwan (toll free)	0800-777-111
Russia (toll free)	8-800-555-01-50

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

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

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

6.3 Global Service Policy

6.3.1 Warranty Policy

The warranty policy for Advantech products is provided below.

6.3.1.1 Warranty Period

Advantech branded off-the-shelf products and third-party off-the-shelf products used to assemble Advantech's Configure-to-Order products are entitled to a two-year global warranty. Products defect in design, materials, or workmanship are covered from the date of shipment.

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

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

6.3.1.2 Repairs Under Warranty

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

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

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 the product or part identification labels.
- The product has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure from which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole discretion.
- The product is damaged beyond repair due to a natural disaster, such as a lightning strike, flood, earthquake, etc.
- The product is sent for updates, upgrades, or tests at the request of the customer who is without warranty.

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

You must fill out basic product and customer information and describe the problems encountered in detail in “Problem Description”. Vague entries such as “does not work” and “failure” are not acceptable.

If you are uncertain about the cause of the problem, please contact Advantech’s application engineers. They may be able to find a solution that does not require sending the product in for repair.

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

6.3.2.2 Returning the Product for Repair

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

We recommend sending cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as the CPU, DRAM, and CF card. If you send all these parts back (because you believe they may be part of the problem), please clearly state that they are included. Otherwise, Advantech will not be responsible for any items not listed. Ensure that the Problem Description is enclosed. European customers who are located outside the European community are requested to use UPS as the shipping company. We strongly recommend adding a packing list to all shipments. Please prepare a shipment invoice according to the following guidelines to minimize goods clearance time:

1. Give a low value to the product on the invoice, or additional charges will be levied by customs that will be borne by the sender.
2. Add information “Invoice for customs purposes only with no commercial value” on the shipment invoice.
3. List RMA numbers, product serial numbers, and warranty status on the shipment invoice.
4. Add information about the country of origin of the goods

In addition, attach an invoice with the RMA number to the carton, write the RMA number on the outside of the carton, and attach the packing slip to save handling time. Please also address the parts directly to the Service Department and mark the package “Attn. RMA Service Department”.

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

Door-to-Door transportation, such as speed post, is recommended for delivery. Otherwise, the sender should bear additional charges such as clearance fees if air cargo shipment methods are used.

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

6.3.2.3 Service Charges

The product is excluded from warranty if

- The product is sent for repair after the warranty period is expired.
- The product is tested or calibrated after the warranty period is expired, and a NPF (no problem found) result is obtained.
- The product, though repaired within the warranty period, has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable environment; improperly maintained by the customer; or failure for which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole discretion.
- The product is damaged beyond repair due to a natural disaster, such as a lightning strike, flood, earthquake, etc.
- The product is sent for updates, upgrades, or tests at the request of the customer who is without warranty.

If a product has been repaired by Advantech, and within three months after such a repair the product requires another repair for the same problem, Advantech will conduct the repair free of charge. However, free repairs do not apply to products that have been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable environment; improperly maintained by the customer; or failure for which Advantech is not responsible whether by accident or other cause. Please contact your nearest regional service center for detailed service quotations.

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

6.3.2.4 Repair Report

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

6.3.2.5 Custody of Products Submitted for Repair

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

6.3.2.6 Shipping Back to Customer

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

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Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

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