MIPICSI Camera RVP Converter Kit

UP Expansion Module

User's Manual 1st Ed

Last Updated: June 16, 2023

Copyright Notice

Acknowledgement

Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● RVP Converter Board	1
● FPC Cable	1
● Power Cable	1
● Screws/Stud Pack	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please the contact our service personnel:
    i. Damaged power cord or plug
    ii. Liquid intrusion to the device
    iii. Exposure to moisture
    iv. Device is not working as expected or in a manner as described in this manual
    v. The device is dropped or damaged
    vi. Any obvious signs of damage displayed on the device
18. DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.

FCC Statement

This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte.
Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur.
Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板及其电子组件	X	X	O	O	O	O
外部信号连接器及线材	X	X	O	O	O	O

O：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。

备注：此产品所标示之环保使用期限，系指在一般正常使用状况下。

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	X	X	O	O	O	O
Wires & Connectors for External Connections	X	X	O	O	O	O

O： The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.

X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.

Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only

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Chapter 1

Product Specifications

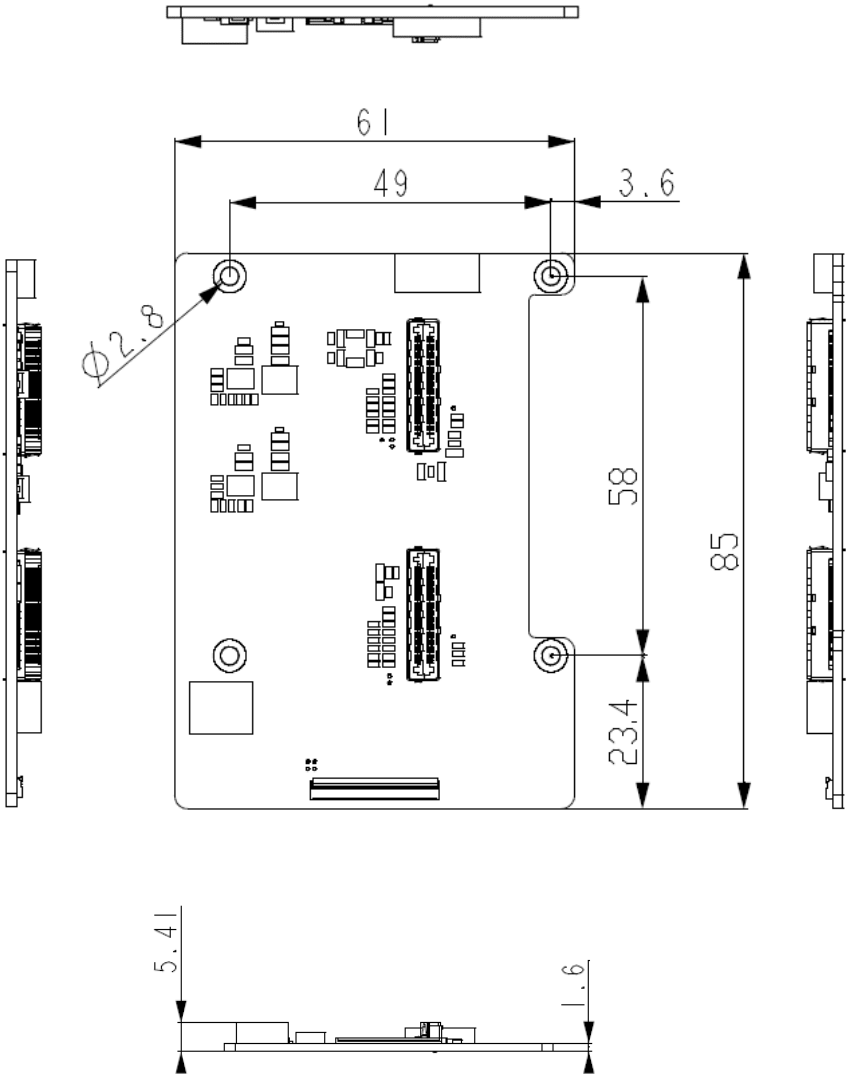
1.1 Specifications

System	
I/O	Power: 5V/2A in from Wafer MIPI-CSI in: 4-Lane + Clock from Camera Module Connector x 2 MIPI-CSI Out: 61-pin FPC Connector x 1
Dimensions	3.3" x 2.4" (85mm x 61mm)
Net Weight	0.1 lb. (0.04Kg)
Gross Weight	0.13 lb. (0.06Kg)
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C), 0.5m/s airflow
Operating Humidity	10% ~90% relative humidity, non-condensing
Certification	-

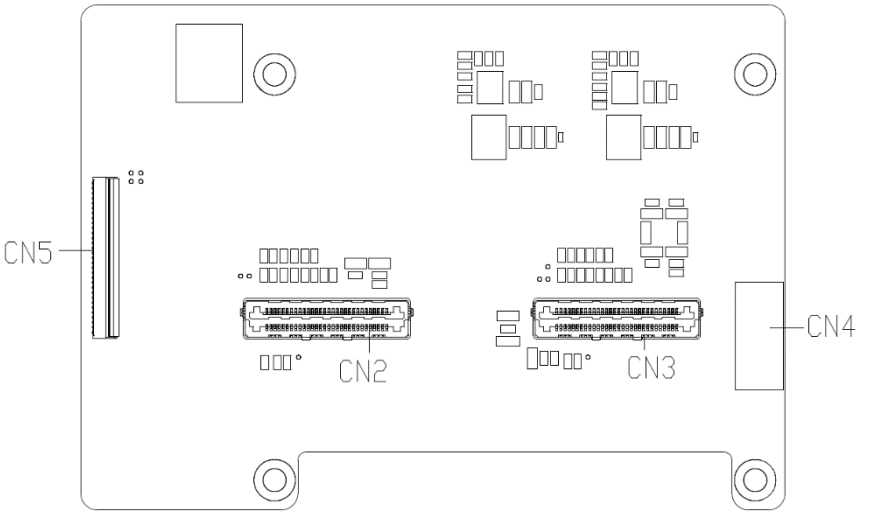
Chapter 2

Hardware Information

2.1 Dimensions



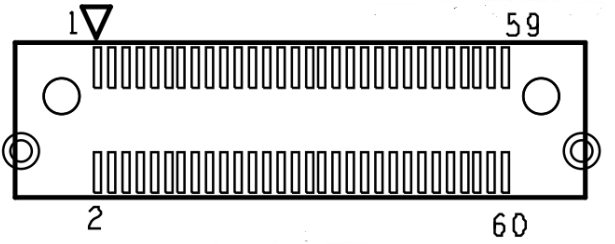
2.2 Board Layout



2.3 List of Jumpers and Connectors

Label	Functional Description
CN2	CRD1
CN3	CRD2
CN4	POWER
CN5	CSI

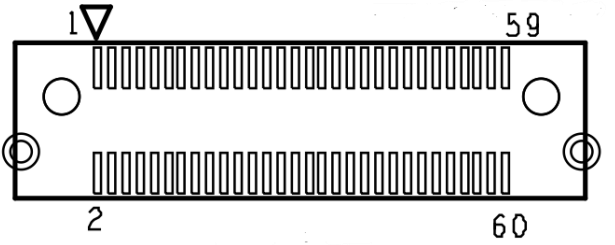
2.3.1 CRD1 (CN2)



Pin	Signal Description	Pin	Signal Description
1	NC	2	5V
3	GND	4	NC
5	NC	6	NC
7	ISH_INT_GP_CRD_GSB	8	CRD1_A0
9	MGCLKOUT2	10	CRD1_A1
11	GND	12	NC
13	MGCLKOUT0	14	GND
15	GPPC_PRIVACY_CAM1	16	NC
17	GPPC_CAM1_CLK_EN	18	NC
19	CAM1_RST#	20	NC
21	CRD1_PWREN	22	NC
23	GPPC_STROBE_CAM1	24	GND
25	I2C1_SDA	26	CSI_A_CK_DN
27	I2C1_SCL	28	CSI_A_CK_DP
29	GPPC_CAM1_SYNCIN	30	GND
31	GPPC_CAM1_SYNCOUT	32	CSI_A_D0_DN
33	GND	34	CSI_A_D0_DP
35	NC	36	GND
37	GND	38	CSI_A_D1_DN

Pin	Signal Description	Pin	Signal Description
39	NC	40	CSI_A_D1_DP
41	1.8V	42	GND
43	1.8V	44	CSI_B_CK_DN
45	GND	46	CSI_B_CK_DP
47	NC	48	GND
49	GND	50	CSI_B_D1_DN
51	GND	52	CSI_B_D1_DP
53	GND	54	GND
55	3.3V	56	CSI_B_D0_DN
57	3.3V	58	CSI_B_D0_DP
59	3.3V	60	GND

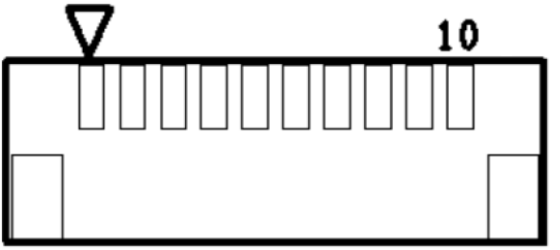
2.3.2 CRD2 (CN3)



Pin	Signal Description	Pin	Signal Description
1	NC	2	5V
3	GND	4	NC
5	NC	6	NC
7	NC	8	CRD2_A0
9	MGCLKOUT3	10	CRD2_A1
11	GND	12	NC

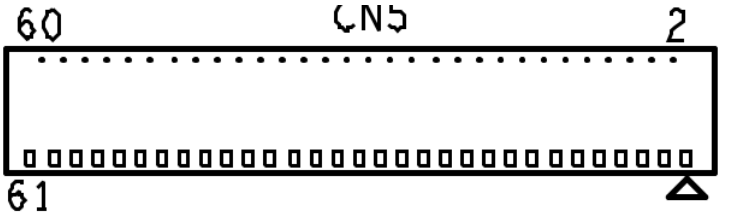
Pin	Signal Description	Pin	Signal Description
13	MGCLKOUT1	14	GND
15	PRIVACY_CAM2	16	NC
17	GPPC_CAM2_CLK_EN	18	NC
19	CAM2_RST#	20	NC
21	CRD2_PWREN	22	NC
23	GPPC_STROBE_CAM2	24	GND
25	I2C5_SDA	26	CSI_D_CK_DN
27	I2C5_SCL	28	CSI_D_CK_DP
29	GPPC_CAM2_SYNCIN	30	GND
31	GPPC_CAM2_SYNCOUT	32	CSI_D_D0_DN
33	GND	34	CSI_D_D0_DP
35	NC	36	GND
37	GND	38	CSI_D_D1_DN
39	NC	40	CSI_D_D1_DP
41	1.8V	42	GND
43	1.8V	44	CSI_C_CK_DN
45	GND	46	CSI_C_CK_DP
47	NC	48	GND
49	GND	50	CSI_C_D1_DN
51	GND	52	CSI_C_D1_DP
53	GND	54	GND
55	3.3V	56	CSI_C_D0_DN
57	3.3V	58	CSI_C_D0_DP
59	3.3V	60	GND

2.3.3 Power (CN4)



Pin	Signal Description	Pin	Signal Description	Pin	Signal Description
1	+5V	2	NC	3	NC
4	GND	5	+5V	6	NC
7	NC	8	GND	9	NC
10	NC				

2.3.4 CSI (CN5)



Pin	Signal Description	Pin	Signal Description
1	GND	2	CSI_A_D0_DN
3	CSI_A_D0_DP	4	GND
5	CSI_A_D1_DP	6	CSI_A_D1_DN
7	GND	8	CSI_A_CK_DN
9	CSI_A_CK_DP	10	GND
11	CSI_B_D0_DP	12	CSI_B_D0_DN

Pin	Signal Description	Pin	Signal Description
13	GND	14	CSI_B_D1_DN
15	CSI_B_D1_DP	16	GND
17	CSI_B_CK_DP	18	CSI_B_CK_DN
19	GND	20	CSI_C_D0_DN
21	CSI_C_D0_DP	22	GND
23	CSI_C_D1_DP	24	CSI_C_D1_DN
25	GND	26	CSI_C_CK_DN
27	CSI_C_CK_DP	28	GND
29	CSI_D_D0_DP	30	CSI_D_D0_DN
31	GND	32	CSI_D_D1_DN
33	CSI_D_D1_DP	34	GND
35	CSI_D_CK_DP	36	CSI_D_CK_DN
37	GND	38	GND
39	MGCLKOUT1	40	MGCLKOUT0
41	MGCLKOUT3	42	MGCLKOUT2
43	CRD1_PWREN	44	STROBE_CAM
45	CRD2_PWREN	46	CAM1_RST#
47	GPPC_CAM_CLK	48	CAM2_RST#
49	GPPC_PRIVACY_CAM2	50	I2C1_SCL
51	ISH_INT_GP_CRD_GSB	52	I2C1_SDA
53	GPPC_CAM_SYNC	54	I2C5_SCL
55	GPPC_PRIVACY_CAM1	56	I2C5_SDA
57	NC	58	NC
59	NC	60	NC
61	NC		

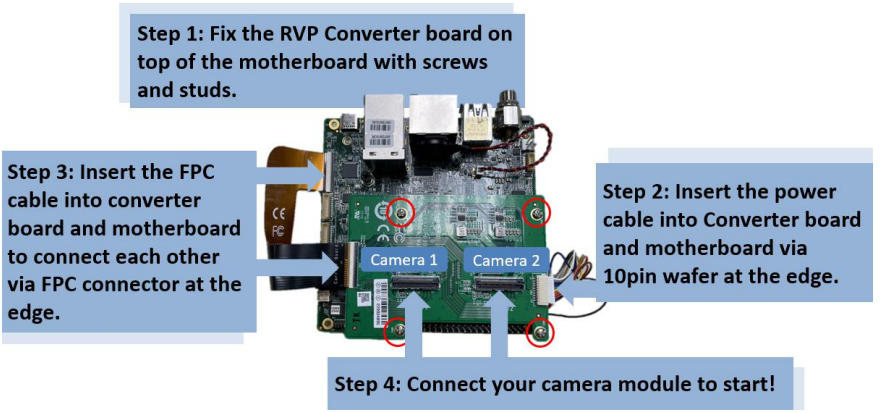
Chapter 3

Hardware & Software Installation Guide

3.1 AR0234 Setup on the UP Squared Pro 7000

The images below outline the setup process for installing dual cameras to the UP Squared Pro 7000. Please note that the device(s) are also compatible with the UP Squared i12 and UP Xtreme i12. Please make sure to use power adapter with correct input voltage.

MIPICSI Camera RVP Converter Kit PN: UPCR-CAMB-A10-0001

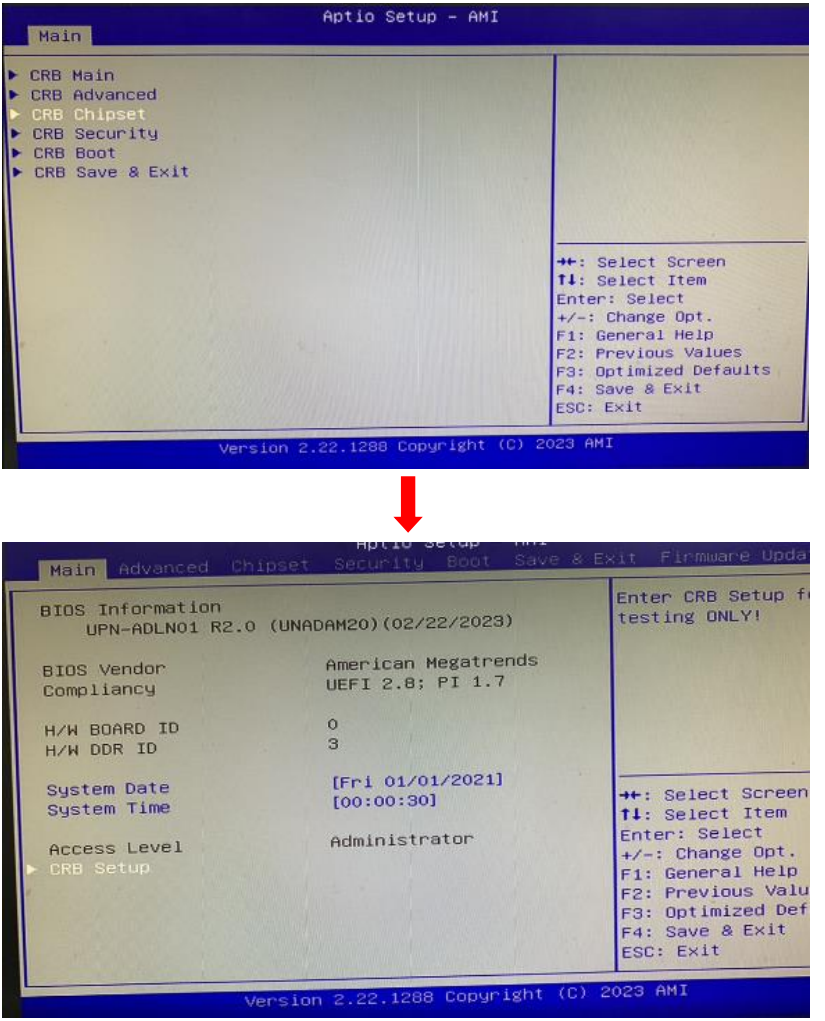


3.2 IPU BIOS Settings

3.2.1 ACPI BIOS Settings for UP Squared Pro 7000

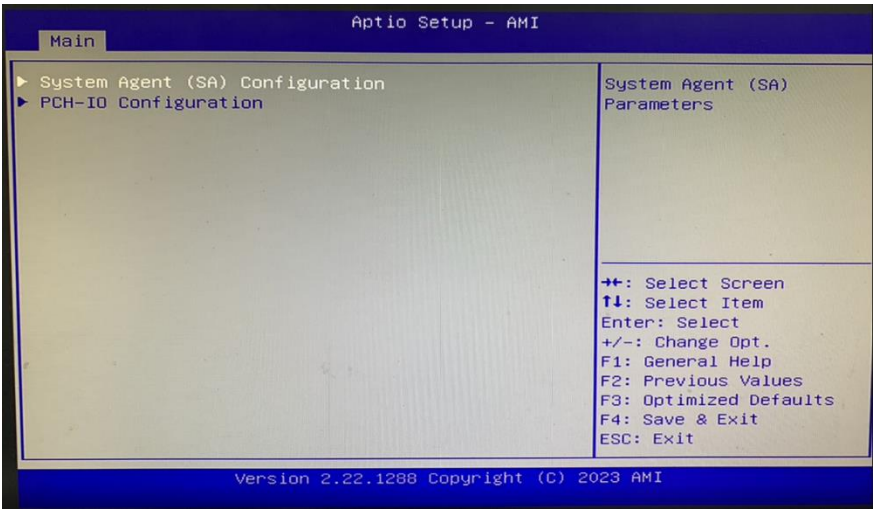
Step 1: Enter the BIOS password: **upassw0rd**, then follow the below path:

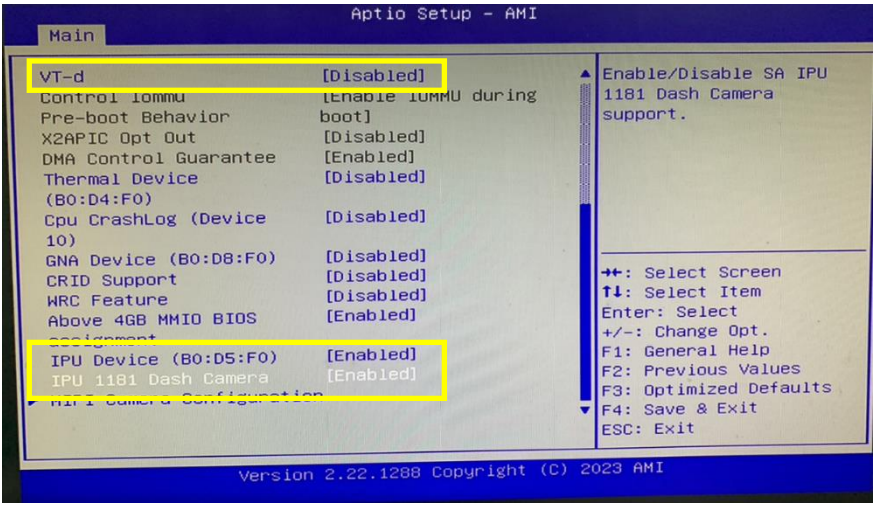
➔ CRB Setup ➔ CRB Chipset



Step 2: Enter **System Agent (SA) Configuration**, and input settings as follows:

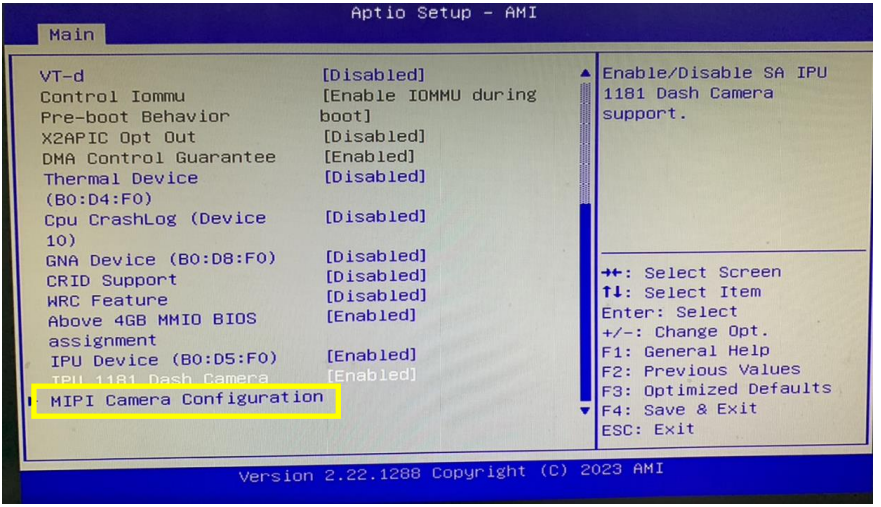
VT-d: Disabled
IPU Device(B0:D5:F0): Enabled
IPU 1181 Dash Camera: Enabled

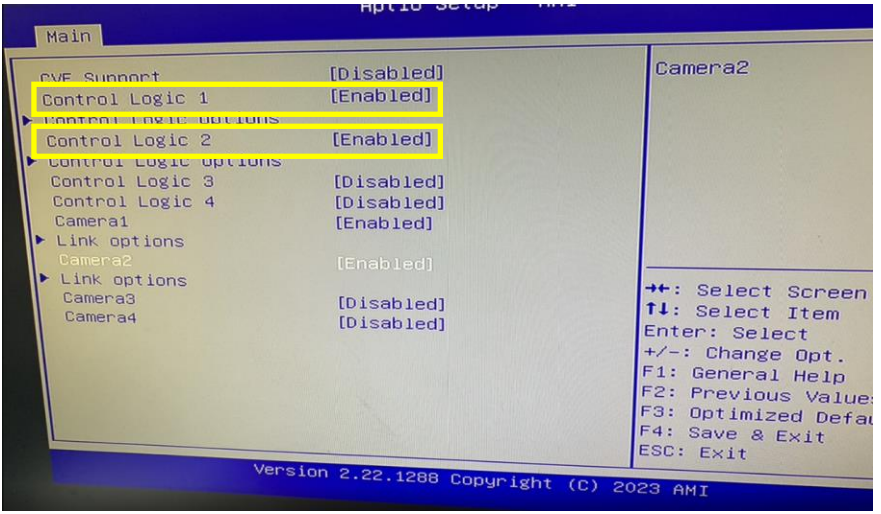




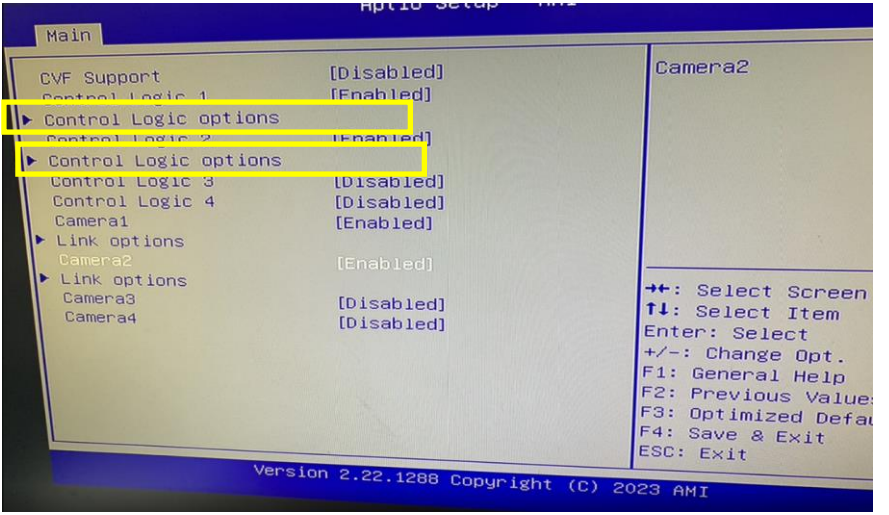
Step 3: Enter MIPI Camera Configuration and input settings as follows:

Use Camera 1 ➔ **Control Logic 1:** Enabled
Use Camera 2 ➔ **Control Logic 2:** Enabled



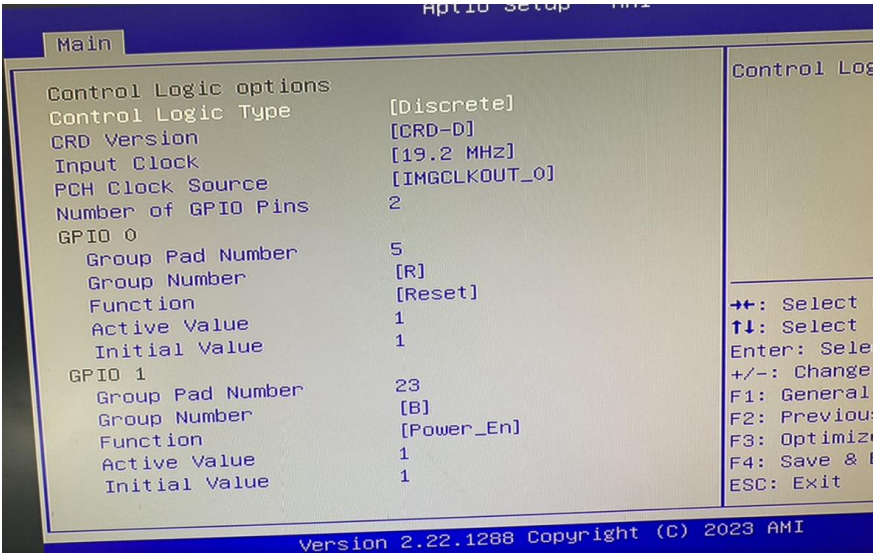


Step 4: Enter Control Logic Options.

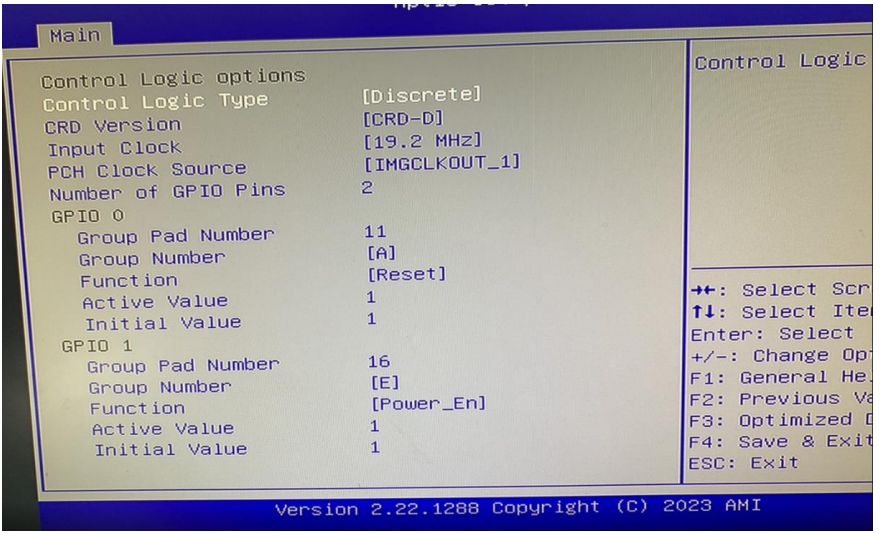


Next, set the Control Logic Options settings as below.

Camera 1:

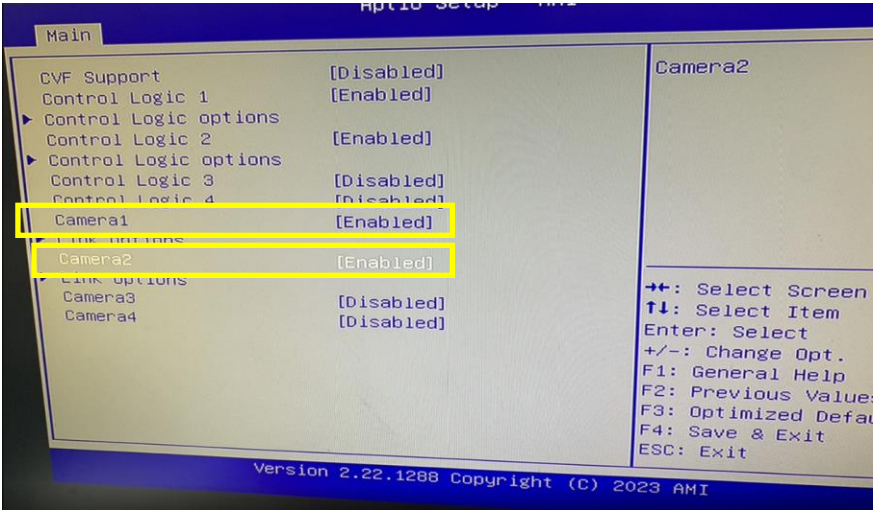


Camera 2:

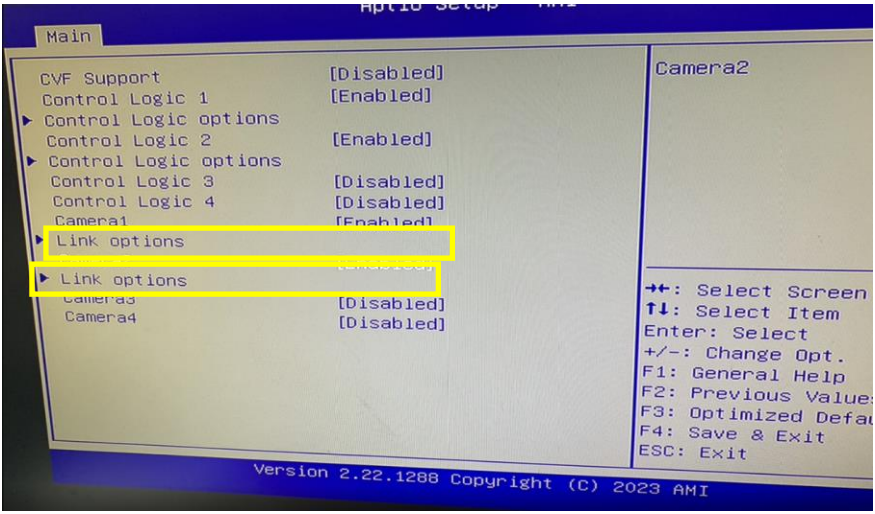


Step 5: Return to main menu and input settings as below.

Use Camera 1 ➔ **Camera 1:** Enabled
Use Camera 2 ➔ **Camera 2:** Enabled

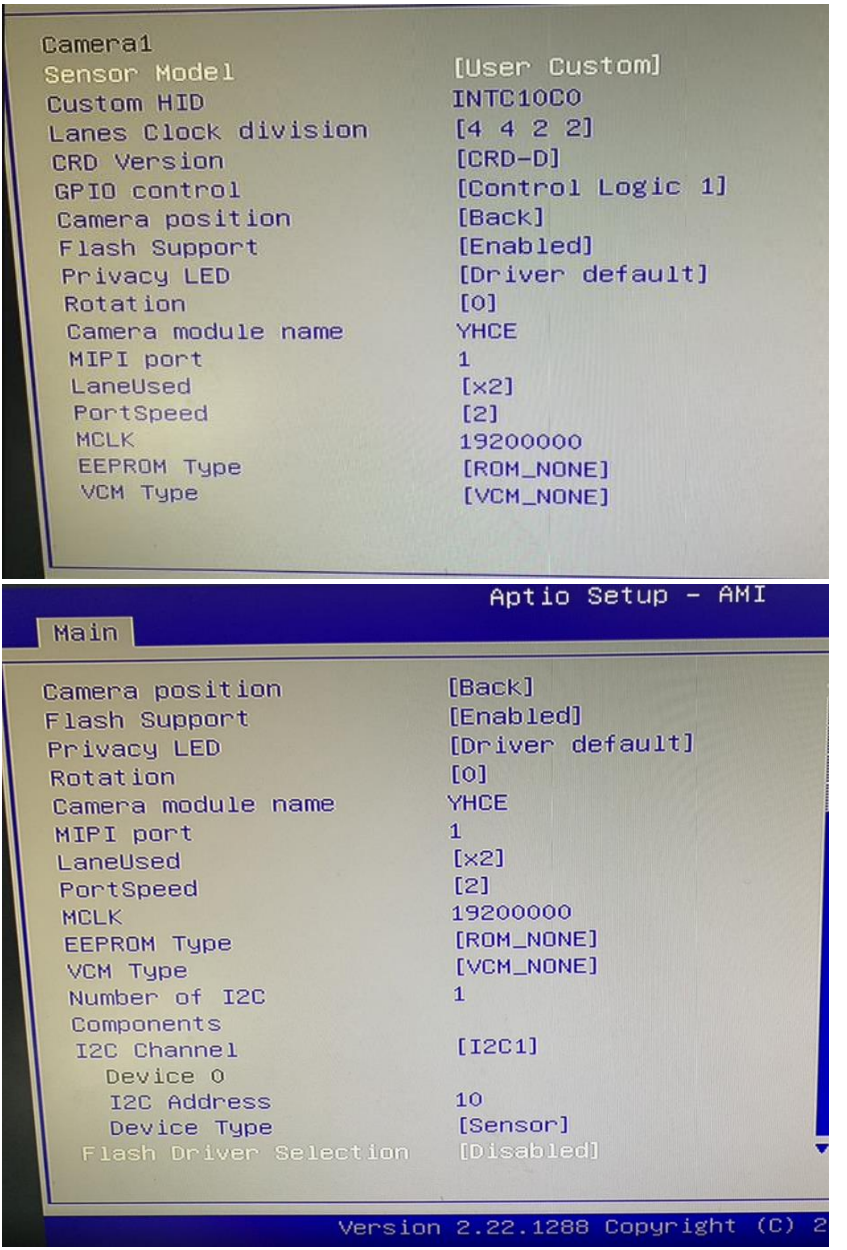


Next, enter Link Options:

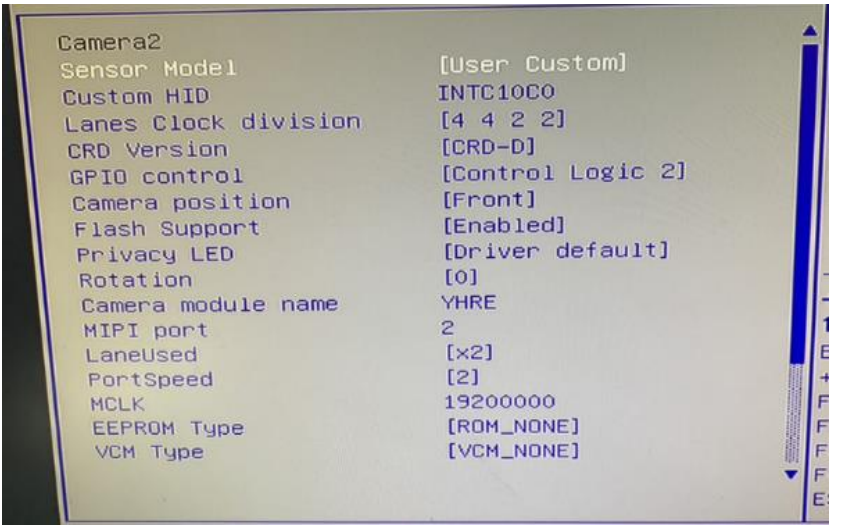


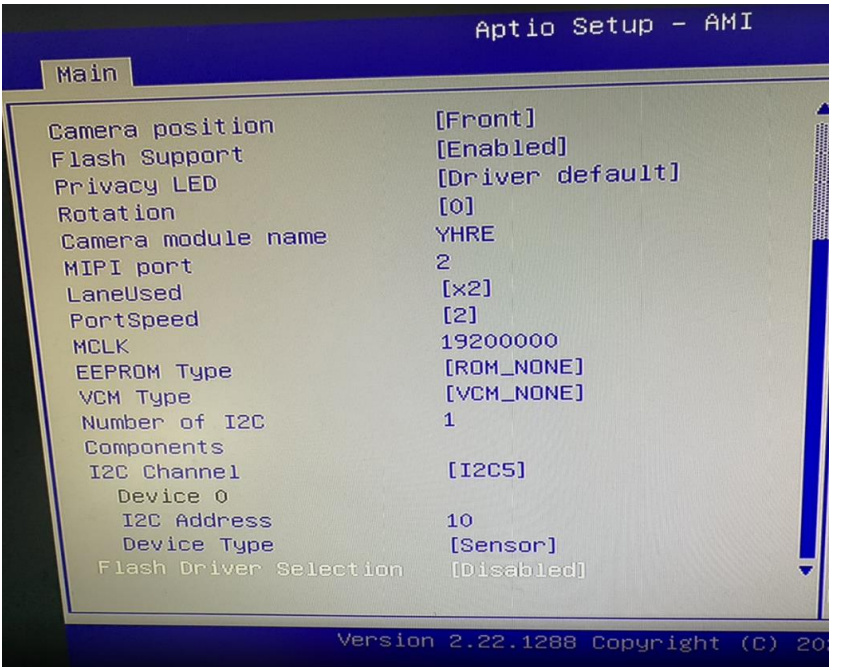
Set Sensor Mode settings as below.

Camera 1:



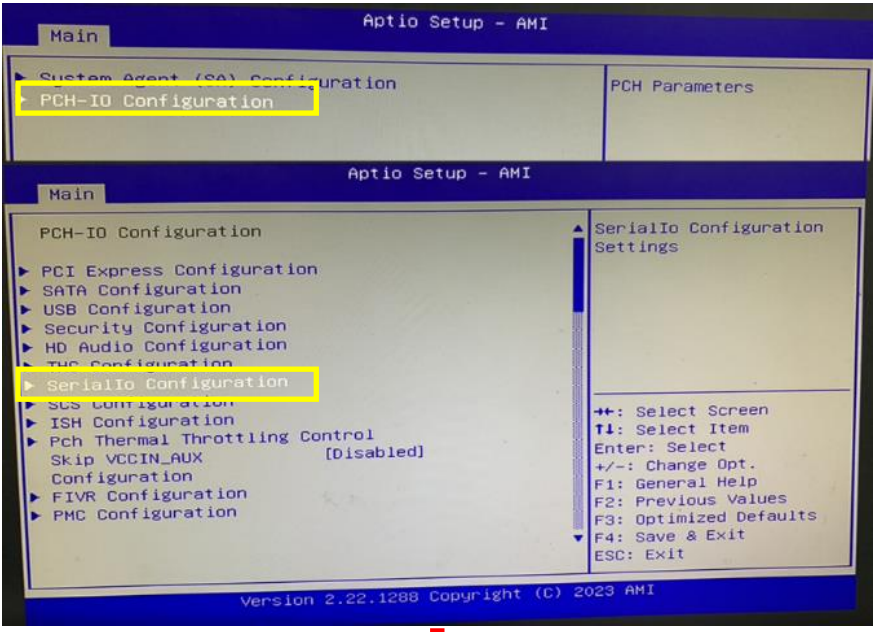
Camera 2:

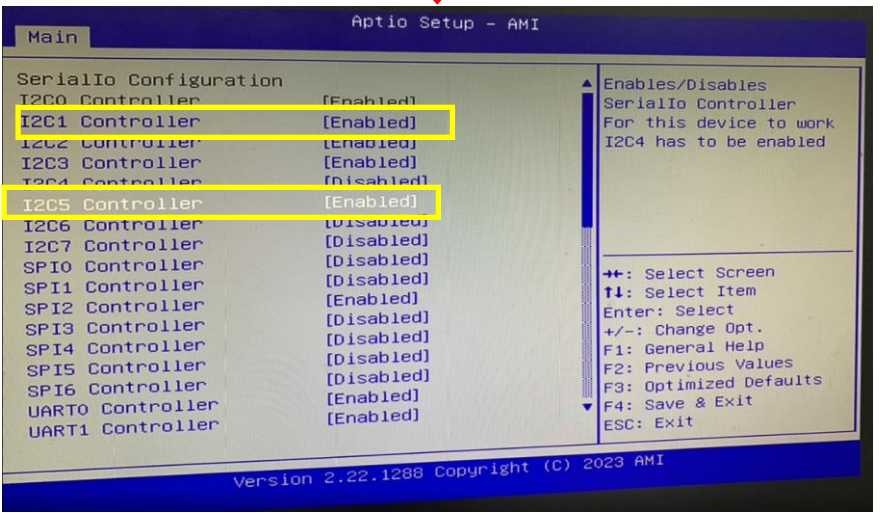

Camera2
Sensor Model [User Custom]
Custom HID INTC10CO
Lanes Clock division [4 4 2 2]
CRD Version [CRD-D]
GPIO control [Control Logic 2]
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
Camera module name YHRE
MIPI port 2
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]


Aptio Setup - AMI
Main
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
Camera module name YHRE
MIPI port 2
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 1
I2C Channel [I2C5]
Device 0
I2C Address 10
Device Type [Sensor]
Flash Driver Selection [Disabled]
Version 2.22.1288 Copyright (C) 20

Step 5: Return to main menu, PCH-IO, then input settings as below.

➔SerialIO Configuration
I2C1 Controller: Enabled
I2C5 Controller: Enabled





3.3 Flashing Ubuntu Image

3.3.1 Obtaining the Image

The Ubuntu image can be found at https://releases.ubuntu.com/22.04/, however, it is recommended that you obtain the Intel IoT Ubuntu image from https://ubuntu.com/download/iot/intel-iot.

3.3.2 Flash Image to Board

The method required to flash the Ubuntu image is dependent on OS.

3.3.2.1 Windows

Step 1: Install balenaEtcher.

Step 2: Open the balenaEtcher application and follow the steps shown.

- Select **.iso image** from the path where the image is stored
- Select USB drive
- Click flash and wait until process is complete

3.3.2.2 Linux

Step 1: Copy or download the image directly to a Linux machine.

Step 2: Create a bootable USB, then follow the steps shown.

Note: Use at least 8GB USB drive and ensure there are no important files inside the USB drive. If there is insufficient space, please store the data in via alternative storage or reformat the drive.

- Open Startup Disk Creator
- Select the **.iso image**
- Click on **Make Startup Disk**

3.3.3 Installing Ubuntu

Follow the on-screen instructions. It is best to install the Ubuntu image on a clean hard disk. If there are partitions from an existing image, please partition accordingly and decide whether to install the image alongside the existing image or erase the existing image prior to installing the new Ubuntu image.

3.3.3.1 System Setup

For remote access, install the **openssh**-server via command, **sudo apt-get install openssh-server**.

- Get the system IP address by using command **ifconfig**
- Use any remote access software (PuTTy, Mobaxterm, VS Code, etc.) to access the system remotely
- To access the system with display, software such as NoMachine can be installed on remote system and user machine

3.3.4 Building Kernel

Kernel repo link: https://github.com/intel/linux-kernel-overlay/tree/lts2021-ubuntu

Before building the kernel, ensure these tools are installed:

```
sudo apt-get install flex bison kernel-wedge gcc libssl-dev
libelf-dev quilt
```

To build the kernel, run **build.sh** script and **linux-headers*.deb**, **linux-image*.deb** and **linux-libc-dev*.deb** packages for Kernel to be generated in the same folder.

```
git clone https://github.com/intel/linux-kernel-overlay/tree/lts2021-ubuntu
cd linux-kernel-overlay
git checkout lts2021-ubuntu
./build.sh
```

The build process depends on the resources available on the machine (factors such as more greater CPU power and larger RAM speed up the build process). It is important to have large amount of storage to build the kernel, and so it is recommended to have at least 256GB of storage on the system.

For more information, refer to README.

3.3.4.1 Replacing Kernel

To overlay the Kernel, follow the steps below.

Step 1: Change to root mode:

```
sudo bash

dpkg -i linux-headers-5.15.94--000_5.15.94-0_amd64.deb
dpkg -i linux-image-5.15.94--000_5.15.94-0_amd64.deb
dpkg -i linux-libc-dev_5.15.94-0_amd64.deb
update-grub
reboot
```

Step 2: Install gstreamer packages

```
sudo apt-get -y install libgstreamer-plugins-base1.0-dev
gstreamer1.0-plugins-base gstreamer1.0-plugins-good
libgstreamer-plugins-good1.0-dev gstreamer1.0-plugins-bad-apps
gstreamer1.0-plugins-bad libgstreamer-plugins-bad1.0-0
gstreamer1.0-plugins-ugly
```

3.3.5 IPU User-Space Libraries

3.3.5.1 Manual Build

These are the prerequisite packages needed before building IPU RPM packages:

```
sudo apt-get -y install cmake build-essential pkg-config
libexpat1-dev rpm autoconf libtool
```

Build ipu6-camera-bins

```
git clone https://github.com/intel/ipu6-camera-bins.git
git checkout rpl-pv-v2
cd ipu6ep
sudo cp -rf lib/* /usr/lib
sudo cp -rf include/* /usr/include/
sudo cp -rf lib/firmware/intel/ipu6ep_fw.bin
/lib/firmware/intel/
```

Build ipu6-camera-hal

```
git clone https://github.com/intel/ipu6-camera-hal.git
    git checkout rpl-pv-v2
    cd ipu6-camera-hal
    mkdir build & cd build
    cmake -DCMAKE_BUILD_TYPE=Release -DIPU_VER=ipu6ep
    -DUSE_PG_LITE_PIPE=ON -DCMAKE_INSTALL_PREFIX=/usr ../
    make -j8
    make package
    sudo rpm -ivh --force --nodeps libcamhal-0.x.x-Linux.rpm
```

Build icamerasrc

Prerequisites: ipu6-camera-bins and ipu6-camera-hal installed.

```
sudo apt-get install libdrm-dev
git clone https://github.com/intel/icamerasrc.git
git checkout rpl-pv-v2

export CHROME_SLIM_CAMHAL=ON
export STRIP_VIRTUAL_CHANNEL_CAMHAL=ON
export
PKG_CONFIG_PATH="/usr/lib/x86_64-linux-gnu/pkgconfig"

./autogen.sh
make -j4
make rpm
cd rpm
sudo rpm -ivh --force --nodeps icamerasrc-*.rpm

sudo reboot
```

3.3.5.1 Verify IPU User-Space Installation

Run dmesg command. Ensure IPU FW is probed and loaded properly.

```
[    6.312185] intel-ipu6 intel-ipu: enabling device (0000 -> 0002)
[    6.312383] intel-ipu6 intel-ipu: Device 0x462e (rev: 0x0)
[    6.312409] intel-ipu6 intel-ipu: physical base address 0x6000000000
[    6.312410] intel-ipu6 intel-ipu: mapped as: 0x00000000d1c6b015
[    6.312744] intel-ipu6 intel-ipu: IPU in secure mode
[    6.312746] intel-ipu6 intel-ipu: IPU secure touch = 0x0
[    6.312747] intel-ipu6 intel-ipu: IPU camera mask = 0xff
[    6.327784] intel-ipu6 intel-ipu: IPC reset done
[    6.327788] intel-ipu6 intel-ipu: cpd file name: intel/ipu6ep_fw.bin
[    6.329328] intel-ipu6 intel-ipu: FW version: 20220510
[    6.329365] intel-ipu6 intel-ipu: No subdevice info provided
[    6.329427] i2c i2c-INTC1090:00: acpi id not found, return 0
[    6.329482] i2c i2c-INTC10C0:00: Getting BIOS data for ar0234
[    6.330263] i2c i2c-INTC10C0:00: Dependent platform device found INT3472:01
[    6.339472] i2c i2c-INTC10C0:01: Getting BIOS data for ar0234
[    6.340344] i2c i2c-INTC10C0:01: Dependent platform device found INT3472:02
[    6.346232] intel-ipu6 intel-ipu: Sending BOOT_LOAD to CSE
[    6.358100] intel-ipu6 intel-ipu: Sending AUTHENTICATE_RUN to CSE
[    6.386368] dw-apb-uart.4: ttyS4 at MMIO 0x600214a000 (irq = 16, base_baud = 114825) is a 16550A
[    6.391497] mei_me 0000:00:16.0: enabling device (0000 -> 0002)
[    6.437151] intel-ipu6 intel-ipu: CSE authenticate_run done
[    6.437199] intel-ipu6 intel-ipu: IPU6-v3 driver version 1.0
```

3.3.6 Testing AR0234 Sensor(s)

Step 1: Run media-ctl -p to check ar0234 sensor(s) are detected.

```
- entity 931: Intel IPU6 CSI2 BE (2 pads, 3 links)
              type V4L2 subdev subtype Unknown flags 0
              device node name /dev/v4l-subdev10
        pad0: Sink
                [fmt:SBGGR12_1X12/4096x3072 field:none]
                ← "Intel IPU6 CSI-2 1":1 []
                ← "Intel IPU6 CSI-2 2":1 []
        pad1: Source
                [fmt:SBGGR12_1X12/4096x3072 field:none
                 crop:(0,0)/4096x3072]
                → "Intel IPU6 CSI2 BE capture":0 []

- entity 934: Intel IPU6 CSI2 BE capture (1 pad, 1 link)
              type Node subtype V4L flags 0
              device node name /dev/video130
        pad0: Sink
                ← "Intel IPU6 CSI2 BE":1 []

- entity 976: ar0234 a (1 pad, 1 link)
              type V4L2 subdev subtype Sensor flags 0
              device node name /dev/v4l-subdev11
        pad0: Source
                [fmt:SGRBG10_1X10/1280x960@1/30 field:none]
                → "Intel IPU6 CSI-2 1":0 [ENABLED]
```

```
- entity 934: Intel IPU6 CSI2 BE capture (1 pad, 1 link)
              type Node subtype V4L flags 0
              device node name /dev/video130
        pad0: Sink
                ← "Intel IPU6 CSI2 BE":1 []

- entity 976: ar0234 a (1 pad, 1 link)
              type V4L2 subdev subtype Sensor flags 0
              device node name /dev/v4l-subdev11
        pad0: Source
                [fmt:SGRBG10_1X10/1280x960@1/30 field:none]
                → "Intel IPU6 CSI-2 1":0 [ENABLED]

- entity 980: ar0234 b (1 pad, 1 link)
              type V4L2 subdev subtype Sensor flags 0
              device node name /dev/v4l-subdev12
        pad0: Source
                [fmt:SGRBG10_1X10/1280x960@1/30 field:none]
                → "Intel IPU6 CSI-2 2":0 [ENABLED]
```

3.3.6.1 Video Loopback Setup

```
sudo apt-get install v4l2loopback-dkms
sudo apt-get install v4l2loopback-utils
sudo modprobe v4l2loopback devices=2
ls -1 /sys/devices/virtual/video4linux
```

Note down the device name listed by above command, e.g. "/dev/video12"

Export following variables into the environment and start the camera stream:

```
sudo bash
export GST_PLUGIN_PATH=/usr/lib/gstreamer-1.0
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/lib
export LIBVA_DRIVER_NAME=iHD
export GST_GL_PLATFORM=egl

gst-launch-1.0 icamerasrc device-name=ar0234 !
video/x-raw,format=NV12,width=1280,height=960 ! v4l2sink
device=/dev/video12
```

Single Camera – Use MIPI camera as usual from v4l2 API.

```
gst-launch-1.0 v4l2src device=/dev/video12 ! videoconvert !
xvimagesink
```

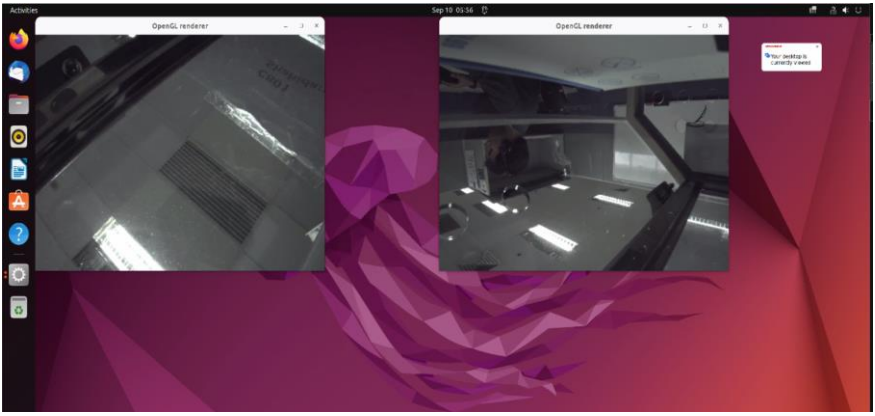
Dual Camera

```
gst-launch-1.0 v4l2src device=/dev/video12 ! videoconvert !
xvimagesink v4l2src device=/dev/video12 ! videoconvert ! xvimagesink
```

Visual Output – Check streaming log from terminal and ensure there are no timeouts and streaming framerate are at 30fps.

```
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[09-10 05:58:18.590] CamHAL[ERR] SetControl: Device node /dev/v4l-subdev12 SetControl(int, int) error: Invalid argument
[09-10 05:58:18.590] CamHAL[WAR] set Ctl ar0234 b [980] cmd set mipi lane [0x009e0940] value 2 failed.
[09-10 05:58:18.641] CamHAL[WAR] bpl defaulting to width for format:IYUV

(gst-launch-1.0:275620): GStreamer-CRITICAL **: 05:58:18.648: Registering meta implementation 'GstCamerasrcMeta' without init function
[09-10 05:58:18.648] CamHAL[ERR] sensor output sub device is not set
[09-10 05:58:18.656] CamHAL[ERR] SetControl: Device node /dev/v4l-subdev11 SetControl(int, int) error: Invalid argument
[09-10 05:58:18.656] CamHAL[WAR] set Ctl ar0234 a [976] cmd set mipi lane [0x009e0940] value 2 failed.
[09-10 05:58:18.683] CamHAL[WAR] bpl defaulting to width for format:IYUV
[09-10 05:58:18.690] CamHAL[ERR] sensor output sub device is not set
Redistribute latency...
[09-10 05:58:20.153] CamHAL[ERR] Poll: Device node fd 20 poll timeout.
Redistribute latency...
[09-10 05:58:20.253] CamHAL[ERR] Poll: Device node fd 20 poll timeout.
fps:29.8351   Camera name: ar0234-2 Stream Id: 0
fps:29.8422   Camera name: ar0234 Stream Id: 0
fps:29.9257   Camera name: ar0234-2 Stream Id: 0
fps:29.9084   Camera name: ar0234 Stream Id: 0
fps:29.8145   Camera name: ar0234-2 Stream Id: 0
fps:29.8695   Camera name: ar0234 Stream Id: 0
fps:29.9271   Camera name: ar0234-2 Stream Id: 0
fps:29.8680   Camera name: ar0234 Stream Id: 0
fps:29.8608   Camera name: ar0234-2 Stream Id: 0
fps:29.8673   Camera name: ar0234 Stream Id: 0
fps:29.8382   Camera name: ar0234-2 Stream Id: 0
fps:29.8675   Camera name: ar0234 Stream Id: 0
fps:29.8446   Camera name: ar0234-2 Stream Id: 0
fps:29.8178   Camera name: ar0234 Stream Id: 0
fps:29.8848   Camera name: ar0234-2 Stream Id: 0
fps:29.8842   Camera name: ar0234 Stream Id: 0
fps:29.8481   Camera name: ar0234-2 Stream Id: 0
fps:29.9004   Camera name: ar0234 Stream Id: 0
fps:29.8927   Camera name: ar0234-2 Stream Id: 0
fps:29.8444   Camera name: ar0234 Stream Id: 0
fps:29.8973   Camera name: ar0234-2 Stream Id: 0
fps:29.8515   Camera name: ar0234 Stream Id: 0
^Chandling interrupt.
Interrupt: Stopping pipeline ...
Execution ended after 0:00:24.432866335
Setting pipeline to NULL ...

Total frame is:684  Camera name:ar0234-2(Id:1) Stream Id:0
Max fps is:29.9271,Minimum fps is:29.8145,Average fps is:29.8668

[09-10 05:58:43.179] CamHAL[INF] CameraHal still running, mInitTimes:1

Total frame is:680  Camera name:ar0234(Id:0) Stream Id:0
Max fps is:29.9084,Minimum fps is:29.8178,Average fps is:29.8688

Freeing pipeline ...
```

From display, observe the video quality from AR0234 sensor(s). The images below are the sample output from dual camera streaming.



3.3.7 OpenVINO Python Demo Setup

Command: **$HOME**

```
sudo apt-get install git
git clone --recurse-submodules
https://github.com/openvinotoolkit/open_model_zoo.git
python3 -m venv $HOME/openvino_env

source $HOME/openvino_env/bin/activate
python -m pip install --upgrade pip
pip install torch==2.0.0+cpu torchvision==0.15.1+cpu
torchaudio==2.0.1 --index-url https://download.pytorch.org/whl/cpu
pip install openvino-dev[ONNX]==2022.3.0
pip install -r $HOME/open_model_zoo/demos/requirements.txt

wget -O $HOME/Videos/video.mp4
'https://www.pexels.com/download/video/3318088/'
omz_downloader --name person-detection-retail-0013 -o
$HOME/intel_models

cd $HOME/open_model_zoo/demos/object_detection_demo/python
# for local video file
python object_detection_demo.py -m
$HOME/intel_models/intel/person-detection-retail-0013/FP32/person
-detection-retail-0013.xml \
-at ssd -i /home/intel/Videos/video1.mp4
# for webcam/ mipi camera(/dev/video0 or /dev/video12)
#python object_detection_demo.py -m
$HOME/intel_models/intel/person-detection-retail-0013/FP32/person
-detection-retail-0013.xml \
#-at ssd -i /dev/video0
```

3.3.8 Intel® Deep Learning Streamer Setup

```
sudo apt install docker.io
sudo docker pull intel/dlstreamer

xhost +

docker run -it --rm -v /tmp/.X11-unix:/tmp/.X11-unix -e
DISPLAY="$DISPLAY" -v $HOME/intel_models:/mnt \
--device /dev/dri/renderD128 --group-add="$(stat -c "%g"
/dev/dri/renderD128)" \
--device /dev/video12:/dev/video12 intel/dlstreamer:latest
```

Once inside the docker, run below command:

```
gst-launch-1.0 v4l2src device=/dev/video12 ! decodebin ! gvadetect
model=/mnt/
intel/person-detection-retail-0013/FP32/person-detection-retail-0
013.xml ! gvawatermark ! videoconvert ! gvafpscounter ! autovideosink
sync=false
```

3.3.9 FAQ

Timeout Issue

If there is a timeout, clear the cache via command rm -rf ~/.cache/gstreamer1.0 and ensure the display is on.

Low FPS During Streaming

In another case where streaming is recording low FPS, change this setting in BIOS settings:

Intel Advance Menu -> Power & Performance -> CPU- Power Management Control --> C states <Disabled>

Appendix A

Connectors

A.1 Connectors

This table provides detailed information about the cables and connectors used by the MIPICSI Camera RVP Converter Kit. If you have any questions about the configuration of your kit, please contact your AAEON sales representative.

Label	Description	Connector Type
CN2	CRD1	(TF)BOARD-BOARD CONN..SMD.60P.180D.MALE.Pitch= 0.5mm.H=3.95mm.SAMTEC.LSHM130-02.5-L-DV-A-S-KTR
CN3	CRD2	(TF)BOARD-BOARD CONN..SMD.60P.180D.MALE.Pitch= 0.5mm.H=3.95mm.SAMTEC.LSHM130-02.5-L-DV-A-S-KTR
CN4	POWER	(TF)Wafer.SMD.Pitch=1.0mm.10P.90D.MALE.BOX NON LOCK.PINREX.710-74-10TWRG.NY9T
CN5	CSI	(TF).FPC/FFC Connector Pitch=0.3mm H=0.9mm.Dual Contact type.SMD.61P.90D.FEMALE.SHENG-DA.BL309P-61S31-TAH0