Getting Started Guide
NXP® i.MX 8M Plus Reference Design

2 Channel MIPI CSI-2 Carrier Board With NXP® i.MX 8M Plus SoM | CBM-TDX-V-I8P-8-32-PW

THE IMAGINGSOURCE
TECHNOLOGY BASED ON STANDARDS

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1. General Information

This application note describes how to get started with the 2-Channel MIPI CSI-2 Carrier Board with NXP i.MX 8M Plus SoM, Part-No. CBM-TDX-V-I8P-8-32-PW.

Figure 1: NXP Reference Design, 2-Channel MIPI CSI-2 Carrier Board with i.MX 8M Plus 4 GB SoM and one MIPI CSI-2 camera.

1.1 Cautions

MIPI CSI-2 CAMERAS HANDLING

Connect MIPI-based cameras ONLY when the system is powered off.

Make sure to unplug the power supply or remove the Power-over-Ethernet cable before connecting or re-connecting MIPI-based cameras.
Otherwise, the cameras may be damaged, may not be detected, or may not work properly.

1.2 Hardware

The procedures described in this document assume that you are using the following hardware components, which are included in this Reference Design:

- Carrier board with 2-channel MIPI CSI-2
- NXP i.MX 8M Plus System on Module with 4 GB RAM
- 32GB EMMC
- Heatsink
- Gigabit Ethernet (RJ45) with Power-over-Ethernet
- USB 3.0 type C
- USB 3.2 Gen 1 type A
- Micro USB debugger
- Micro HDMI
- DFM 36SX290-ML, 36S MIPI CSI-2 color camera
- TLH 10-M lens holders
- TBL 8 C, M12 lens with IR-cut filter
- CA-FFC-22P/0.3 m cables

1.3 Software

For your convenience, some software packages have been pre-installed:

- Yocto-Version: OpenEmbedded "Scarthgap" / Toradex BSP 7.1.y.
- "libcamera": an open-source camera stack and framework for Linux including patches by The Imaging Source:
  - o libcamera is required to operate different MIPI-based cameras.

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ℹ	**Note** libcamera is an open-source camera stack and framework, which utilizes the ISP of the NXP SoM. Its detailed use and functionality are not covered by this document. For more information refer to: https://libcamera.org/

2. Assembling the Hardware

The procedures described in this chapter should be followed to ensure the best first-time experience with this reference design.

1. Begin by screwing the TBL 8 C lens into the TLH 10-M lens mount holder.

2. Mount the TLH 10-M lens mount holder to the DFM 36SX290-ML camera.

3. Connect the CA-FFC-22P/0.3 m cable to one of the two black MIPI CSI-2 22-pin connectors (please see image below):
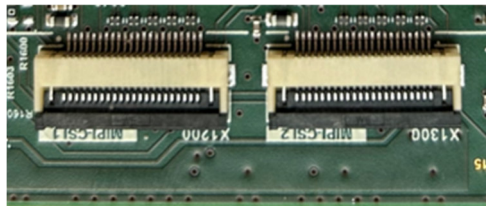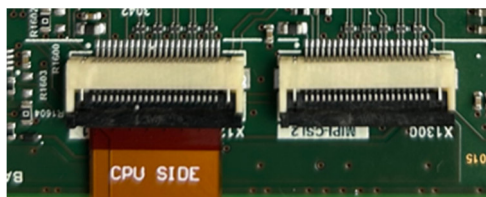

    a. To do so, unlock the black clips of the MIPI CSI-2 22-pin connector by pulling it up.

    b. Insert one end of the FFC cable, labeled 'CPU SIDE,' into the connector with 22 pins facing downward. Then, secure the cable by locking the black clips in place.

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⚠️	**MIPI CSI-2 CABLE "CPU SIDE"** Pay attention to the lettering on the MIPI CSI-2 cable. Ensure that the cable end with the inscription "CPU SIDE" is plugged into the SoM. Otherwise, the carrier board may be damaged or behave erratically.

4. Connect the other end of the FFC cable to the DMM 36SX290-ML camera (please see image below).

⚠️	**MIPI CSI-2 CABLE "CAM SIDE"** Pay attention on the lettering of the MIPI CSI-2 cable. Ensure that the cable end with the inscription "CAM SIDE" is affixed to the camera. Otherwise, the carrier board may be damaged or behave erratically.
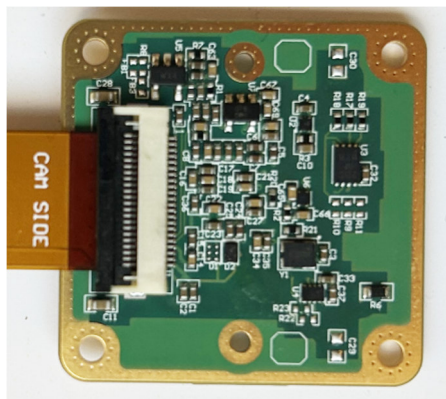
5. Connect a USB mouse and a USB keyboard to the USB3 ports (type A and type C):
    a. Note: No mouse and keyboard are included in this reference design kit.
6. Connect the HDMI cable to the Micro HDMI port of the reference design and the other end to a monitor (HD resolution or higher is recommended):
    a. Note: No HDMI cable and no monitor are included in this reference design kit.
7. Either use auxiliary power supply (12-24VDC, JST-B4B-PH connector) or Power-over-Ethernet (RJ45 connector) to supply power to the board:
    a. Note: No power supply unit and no Ethernet cable are included in this reference design kit.

⚠️	**MIPI CSI-2 CAMERAS HANDLING** **Connect MIPI-based cameras ONLY when the system is powered off**. Make sure to unplug the power supply or remove the Power-over-Ethernet cable before connecting or re-connecting MIPI-based cameras. Otherwise, the cameras may be damaged, may not be detected, or may not work properly.

3. Image Acquisition

3.1 Using 'gst-mipi-demo'

The easiest way to start with image acquisition and image display is by using the simple GUI application *gst-mipi-demo*, which is pre-installed and starts automatically:

The demo application allows for:

- Switching between cameras
- Starting and stopping image acquisition
- Configuring exposure time, gain, auto exposure time

> **Note**
>
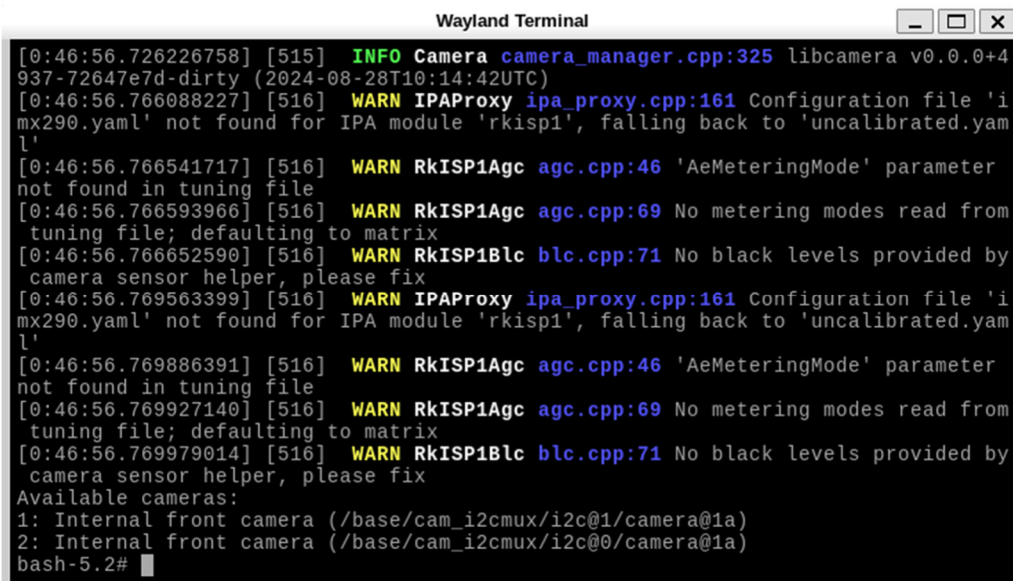> The 'gst-mipi-demo' application is automatically run by the "autostart-gst-mipi-demo" service.

3.2   Using libcamera and GStreamer

The libcamera open-source framework is used as video source for the GStreamer framework, which in turn is the default image processing framework for NXP i.MX8 SoMs.

To get more details about any connected MIPI CSI-2 cameras, open a Wayland terminal and type in:

#cam -l

You should get a similar output:

Where two MIPI cameras are found and listed as:

/base/cam_i2cmux/i2c@0/camera@1a

/base/cam_i2cmux/i2c@1/camera@1a

To start image acquisition and image display with an arbitrary camera, execute the following command:

#gst-launch-1.0 libcamerasrc ! video/x-raw,format=YUY2 ! waylandsink

```
                          Wayland Terminal                    _ □ ✗
bash-5.2# gst-launch-1.0 libcamerasrc ! video/x-raw,format=YUY2 ! waylandsink▉
```

To start image acquisition and image display with a specific camera, execute the following command:

#gst-launch-1.0 libcamerasrc camera-name=/base/cam_i2cmux/i2c@1/camera@1a ! video/x-raw,format=YUY2 ! waylandsink

```
                          Wayland Terminal                    _ □ ✗
bash-5.2# gst-launch-1.0 libcamerasrc camera-name=/base/cam_i2cmux/i2c@1/camera@
1a ! video/x-raw,format=YUY2 ! waylandsink▉
```

This will display the camera video stream:

4.   Documentation

Refer to the following online documentation:

- To find the Technical Reference Manuals for 36S MIPI CSI-2 cameras, refer to:
  https://www.theimagingsource.com/en-de/embedded/mipi-csi-2/36s/

- To find the Technical Reference Manual for the carrier board, refer to:
  https://www.theimagingsource.com/embedded/

- For FAQs or Support refer to:
  https://www.theimagingsource.com/support/

Revision History

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AN20250212-01	12 February 2025	Initial release version of this document.

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