

i.MX8MQ EVK Display Selection Guide

Marco Franchi

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1. Introduction

This document describes the i.MX8MQ EVK HDMI output and mini-SAS connectors features on Linux and Android user cases, covering since the daughter-board supported by the board to the process to change Device Tree (DTS) files or Boot Images, and enable these different display options on the i.MX8MQ EVK board.

This guide is based on the L4.9.88_2.0.0-ga release and O8.1.0_1.3.0_8M-ga release.

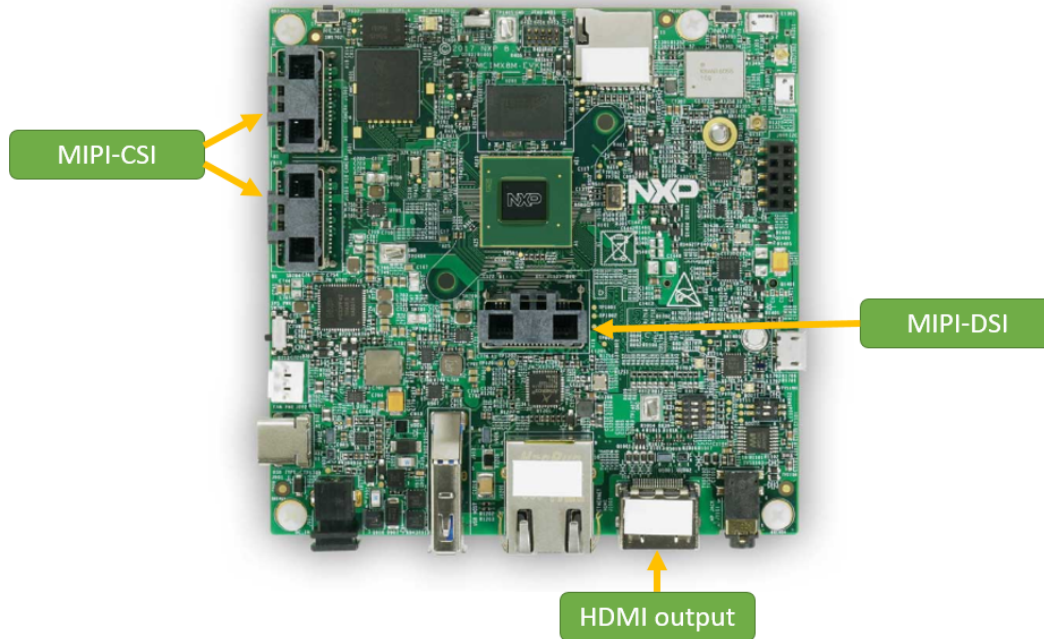


Figure 1. i.MX8MQ EVK mini-SAS connectors and HDMI output

The document covers the following:

- Obtaining a Linux L4.9.88_2.0.0-ga and an Android O8.1.0_1.3.0_8M-ga Image release
- Changing the DTS files or Boot Images to define imx8mq display options
- i.MX8MQ EVK daughter-boards
- i.MX8MQ EVK Display features

2. Obtaining a Linux L4.9.88_2.0.0-ga Image

There are two methods available to install the L4.9.88_2.0.0-ga onto the i.MX8MQ EVK board:

2.1. i.MX BSP Releases

Prebuilt Images can be downloaded from the [NXP i.MX developer](#) resources webpage. These images are composed by a Linux Kernel, ATF, SC firmware and U-Boot, and can be directly written to a SDCard. This SDCard can be then placed in the SDCard slot on the i.MX8MQ EVK and booted.

2.2. The Yocto Project Build

To build an Yocto Image from the source code, please refer to the "i.MX Yocto Project User's Guide" for detailed information.

3. Obtaining an Android O8.1.0_1.3.0_8M-ga Image

There are two methods available to install the O8.1.0_1.3.0_8M-ga onto the i.MX8MQ EVK board:

3.1. i.MX BSP Releases

Prebuilt Images can be downloaded from the [NXP i.MX developer](#) resources webpage. These Images are composed of U-Boot, SDCard partition table file, system, and vbmeta. It can be written using the mfgtool2-android-mx8mq-evk-sd.vbs and a SDCard. Please, refer to the "Android User's Guide" for more details.

3.2. Android Build

To build an Android Image from the source code, please refer to the "Android User's Guide" for detailed information.

4. Changing DTS files on Linux

The L4.9.88_2.0.0-ga release for i.MX8MQ EVK has some Device Tree files available. These DTS files affect the behavior of the displays connected to the HDMI output and mini-SAS connectors, which expand your multimedia experience in combination with the range of daughter-board available for the i.MX8MQ EVK.

Table 1. i.MX8MQ EVK DTB files available

DTB Name	Supported outputs	Display controller	daughter-board	Max Resolution
fsl-imx8mq-evk.dtb	HDMI output	DCSS	-	3840x2160@60 fps
fsl-imx8mq-evk-lcdif-adv7535.dtb	MIPI-DSI	LCDIF	IMX-MIPI-HDMI	1280x720@60fps
fsl-imx8mq-evk-dcss-adv7535.dtb	MIPI-DSI	DCSS	IMX-MIPI-HDMI	1920x1080@60fps
fsl-imx8mq-evk-dcss-rm67191.dtb	MIPI-DSI-OLED display	DCSS	MIPI-DSI-OLED	1920x1080@60fps

DTB Name	Supported outputs	Display controller	daughter-board	Max Resolution
fsl-imx8mq-evk-dual-display.dtb	HDMI output + MIPI-DSI	DCSS + LCDIF	IMX-MIPI-HDMI	3840x2160@60fps + 1280x720@60fps

To change the DTB files on Linux, follow the steps below. Please ensure you have an image loaded into a SDCard and that your board successfully boots U-Boot and Kernel:

Step 1: Reboot the board and press any key to stop the boot process at U-Boot.

Step 2: Type the desired DTB file following the example command line below to modify the default DTB by changing the file name to match to one of the DTB files listed above:

```
=> setenv fdt_file "fsl-imx8mq-evk.dtb"
```

Step 3: Save the environment variable:

```
=> saveenv
```

Step 4: Boot the Linux Kernel by resetting the board:

```
=> boot
```

5. Changing Boot Images on Android

The O8.1.0_1.3.0_8M-ga releases for i.MX8MQ EVK has some Boot Images available. These Boot Images were created to avoid any undesired touch in the boot args commands and are composed by kernel information, device name and boot. Such as DTS files, the Boot Image can affect the behavior of the displays too, expanding the user multimedia experience in combination with the range of daughter-board available for the i.MX8MQ EVK.

Table 2. i.MX8MQ EVK Boot Images available

Boot Image	Supported outputs	daughter-board	Max Resolution
boot-imx8mq.img	HDMI output	-	3840x2160@60fps
boot-imx8mq-mipi.img	MIPI-DSI	IMX-MIPI-HDMI	1280x720@60fps
boot-imx8mq-mipi-panel.img	MIPI-DSI	MIPI-DSI-OLED	1920x1080@60fps
boot-imx8mq-dual.img	HDMI output + MIPI-DSI	IMX-MIPI-HDMI	3840x2160@60fps + 1280x720@60fps

To change the Boot Image on Android, before to create the SDCard image, change the boot-imx8mq.img and vbmeta-imx8mq.img according to the desired display option.

For example, to test the Dual Display feature, rename:

- boot-imx8mq-dual.img to boot-imx8mq.img;
- vbmeta-imx8mq-dual.img to vbmeta-imx8mq.img;

Create the Android image and boot the board. Please, refer to the "Android User's Guide" for more details.

6. i.MX8MQ EVK daughter-boards

The i.MX8MQ EVK has a set of expanding boards that can be purchased separately to improve the user experience. You can check some of these boards below, relative to DSI and HDMI features.

6.1. MIPI-DSI to HDMI converter board

The IMX-MIPI-HDMI converter board allows 1 HDMI output via the MIPI DSI interface. This board connects to the MIPI-DSI connector through the mini-SAS cable.

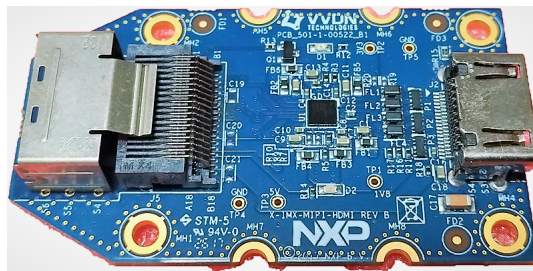


Figure 2. IMX-MIPI-HDMI converter board

6.2. MX8 DSI OLED display

The MX8-DSI-OLED is a MIPI-DSI interface for OLED display with touch screen support.

Key specification / features:

- 5.49" FHD (1920x1080@60fps) AMOLED display
- 16.7M (RGB*8bits) display color
- Touch screen
- 4-lane MIPI-DSI interface for display
- I2C interface for touch and control



Figure 3. MX8-DSI-OLED display panel

7. i.MX8MQ EVK Display features

This section shows in details what you can expect combining the DTS files and the daughter-board available for i.MX8MQ EVK.

7.1. 4k display

The 4k@60fps is available by default using the `fsl-imx8mq-evk.dtb` file or the `boot-imx8mq.img` for Android. The user just need to connect the HDMI output to a 4k monitor. There is no support for MIPI-DSI using this default DTB file.

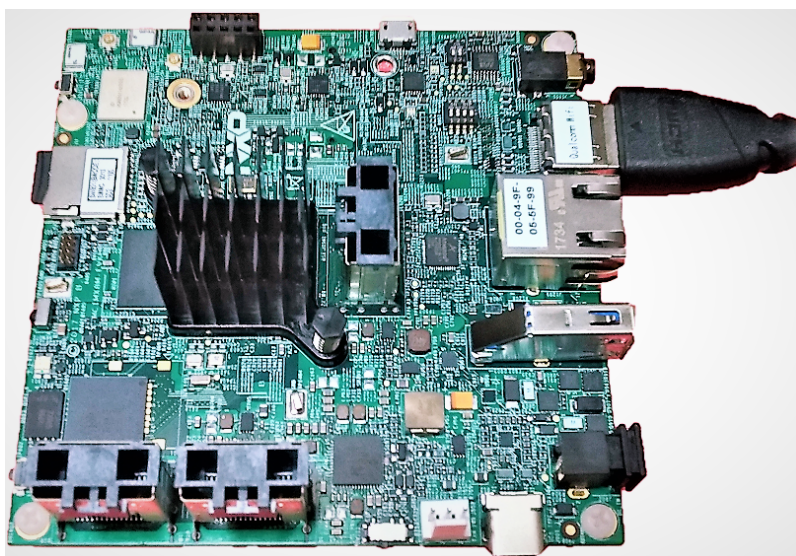


Figure 4. HDMI output connection example

7.2. MIPI-DSI HDMI display

Using the IMX-MIPI-HDMI daughter-board, the user can select the `fsl-imx8mq-evk-dcss-adv7535.dtb` or `fsl-imx8mq-evk-lcif-adv7535.dtb` to reach up to 1080@60fps and 720@60fps output images respectively on Linux or `boot-imx8mq-mipi.img` on Android.

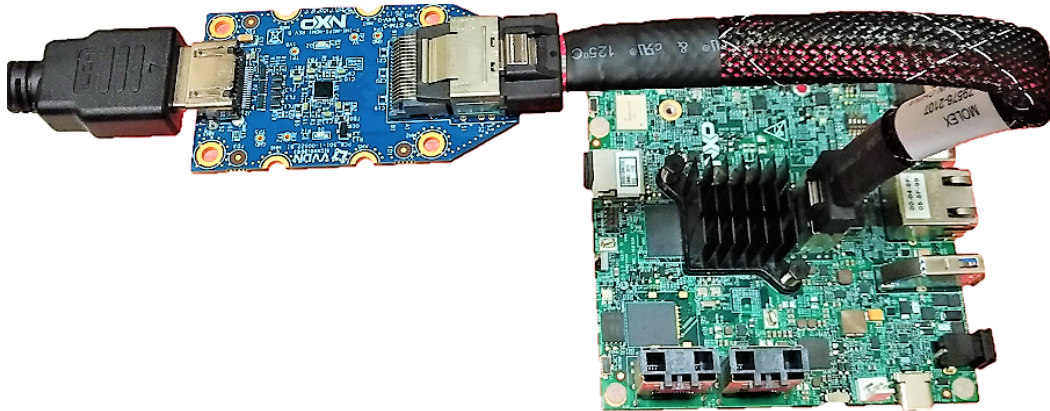


Figure 5. MIPI-DSI connection example

The `fsl-imx8mq-evk-dcss-adv7535.dtb` uses the DCSS driver to control the MIPI-DSI connector, which disables the native HDMI output.

7.3. OLED display panel

Other way to reach up to 1080p@60fps on i.MX8MQ EVK is by using the OLED display panel. This accessory can be connected to the MIPI-DSI using the `fsl-imx8mq-evk-dcss-rm67191.dtb` or `boot-imx8mq-mipi-panel.img` on Android. The OLED Display uses the DCSS driver too, so there is no support to the native HDMI output in this case.



Figure 6. DSI OLED display example

7.4. Dual Display

As the MIPI-DSI can be controlled by the LCDIF driver too, the user can set the HDMI output and the MIPI-DSI at the same time, reaching up to 4k@60fps and 720@60fps respectively. For this, change the DTB file to `fsl-imx8mq-evk-dual-display.dtb` or the Boot Image to `boot-imx8mq-dual.img`, connect the 4k monitor to the HDMI output and other HDMI display to the MIPI-DSI using the IMX-MIPI-HDMI daughter-board.

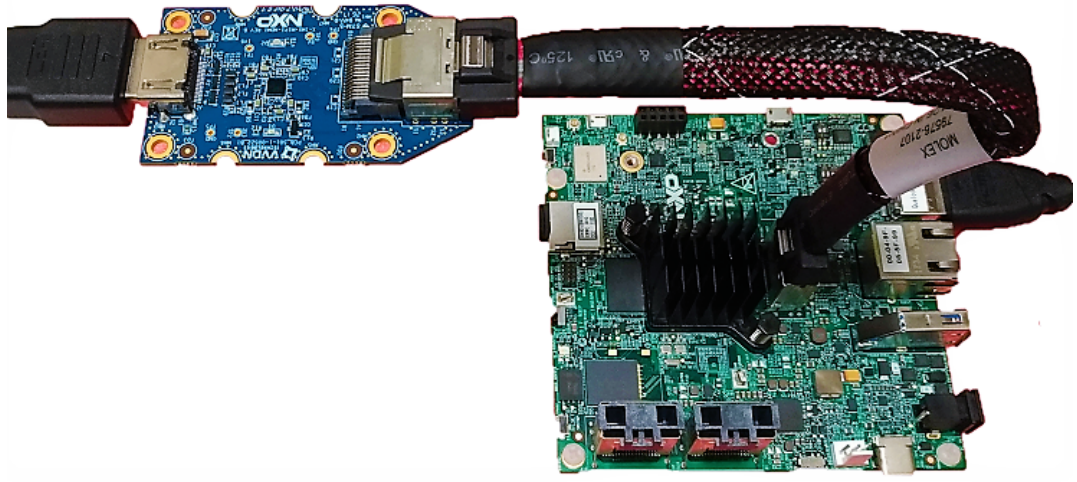


Figure 7. Dual display connection example