



Application Note

# Astra™ Machina Foundation Series MIPI DSI to HDMI Hardware Connection

**Abstract:** This document provides a detailed guide on connecting the Astra Machina Foundation Series to HDMI displays via a MIPI DSI to HDMI converter, including required hardware, connection diagrams, and setup instructions for seamless video and audio transmission.

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# 1. Overview

The Astra™ Machina Foundation Series offers evaluation-ready kits that facilitate quick and straightforward prototyping with the Synaptics SL-Series of embedded Linux® and Android™ processors. Featuring a modular design, these kits include interchangeable core compute modules, a standard I/O board and variety of daughter cards for connectivity, debugging, and various I/O configurations.

## 1.1. Scope

This document provides a clear MIPI DSI to HDMI Conversion connection diagram that is applicable to Core Module with SL1680/SL1640/SL1620 SoC embedded inside. This ensures to fulfill MIPI DSI to mate the popular TV with Synaptics designed-in DSI to HDMI converter board.

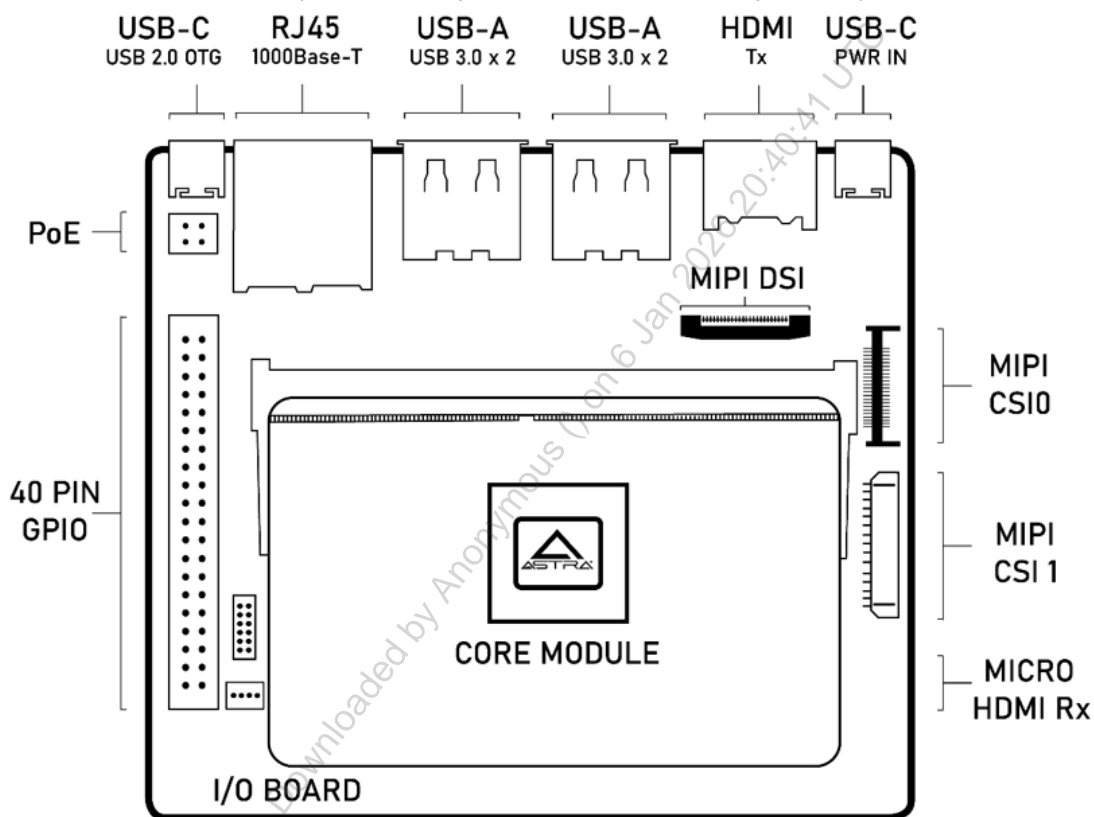


Figure 1. Overview of Astra Machina Foundation Series

## 1.2. Accessories Hardware Items Needed

- [a] Astra Machina Foundation Series.
- [b] Synaptics DSI to HDMI converter board to convert MIPI to HDMI Tx (PN: 730-C01076-01)
- [c] TV with HDMI Type A Rx.
- [d] 22-pin/0.5mm pitch FFC cable and standard HDMI Type A Cable.
- [e] DuPont Bread board Jumper wires in female on both ends.

### 1.3. Connection Block Diagram

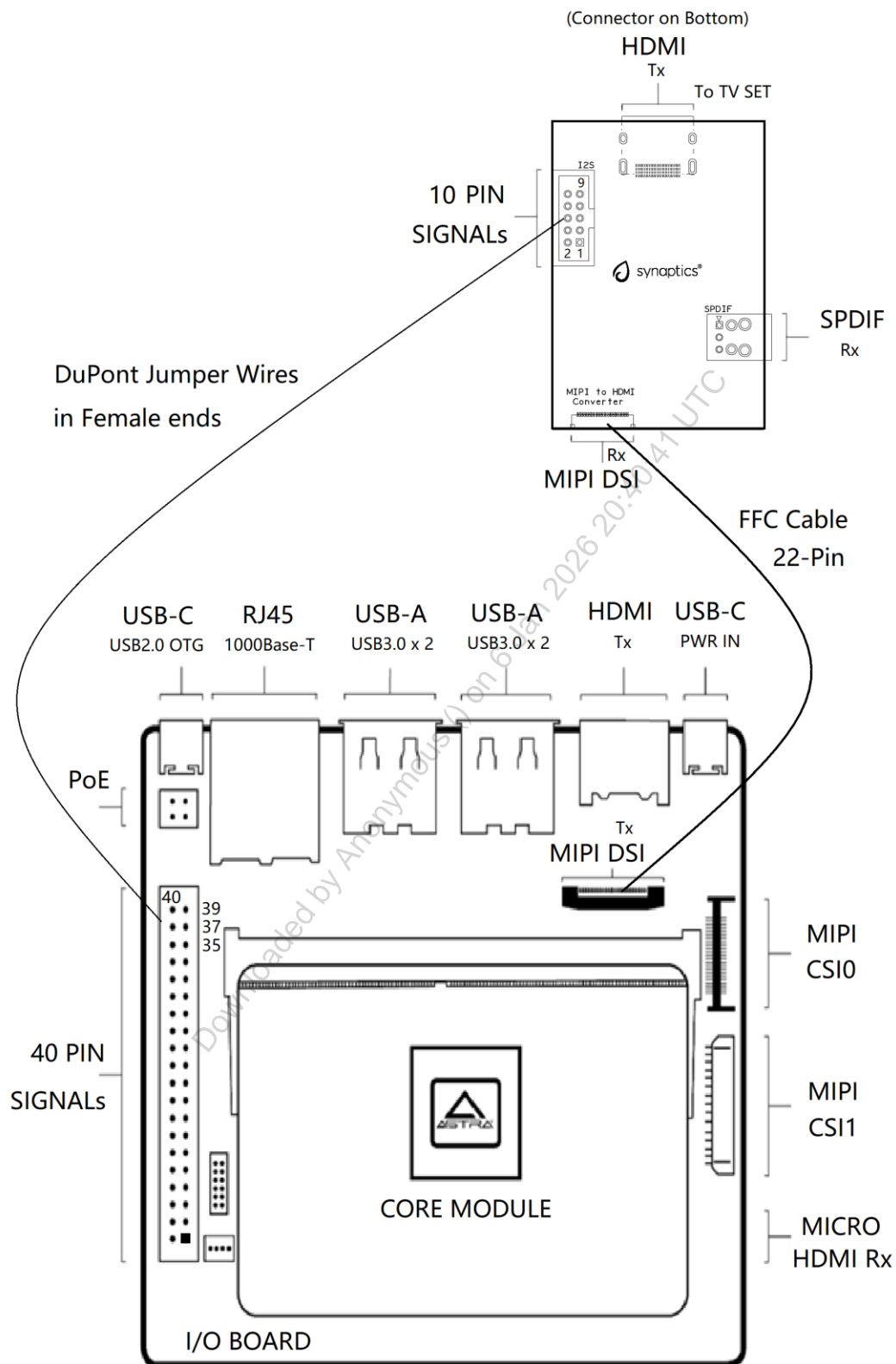


Figure 2. Connection block diagram for MIPI DSI to HDMI Conversion

## 1.4. Making the Connections

- [a] Get any type of SL series of Core Module stuffed with Astra I/O Board.
- [b] Connect a HDMI Type A cable between TV and DSI to HDMI Converter Board, shown in [Figure 5](#).
- [c] Connect a FFC cable in the length of 51mm between MIPI DSI connector of Astra I/O Board and FFC connector of DSI to HDMI converter board, as shown in [Figure 2](#). Note that the Actuator of FFC connector on either I/O board or converter board **MUST** be open prior to FFC cable being plugged as well as FFC being stiffener film side for orientation, shown in [Figure 3](#) and [Figure 4](#).
- [d] Connect DuPont Jumper wires per below pin-pairs to enable HDMI audio, as shown in [Figure 2](#).

Astra I/O Board	Signals	Converter Board
40 PIN#		10 PIN#
35	I2S_LRCK	5
37	I2S_MCLK	9
38	I2S_BCLK	7
40	I2S_DATA	3
39	GND	8
34	GND	6

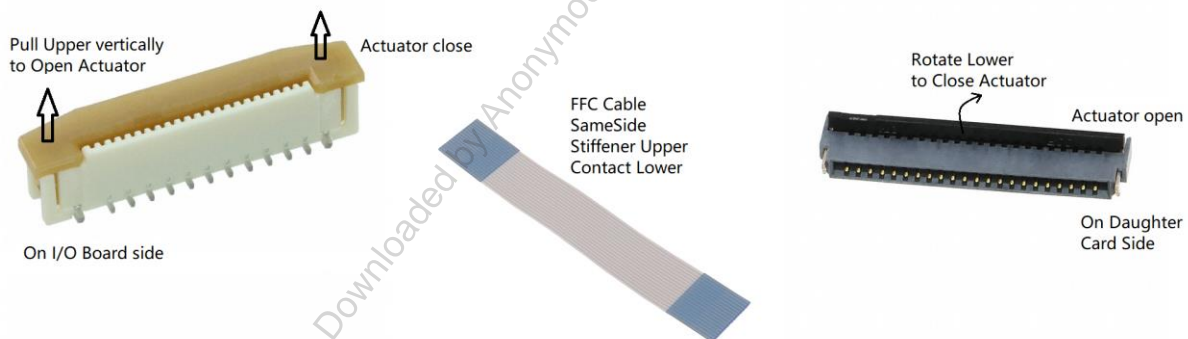


Figure 3. Connector Actuator Status & FFC cable side

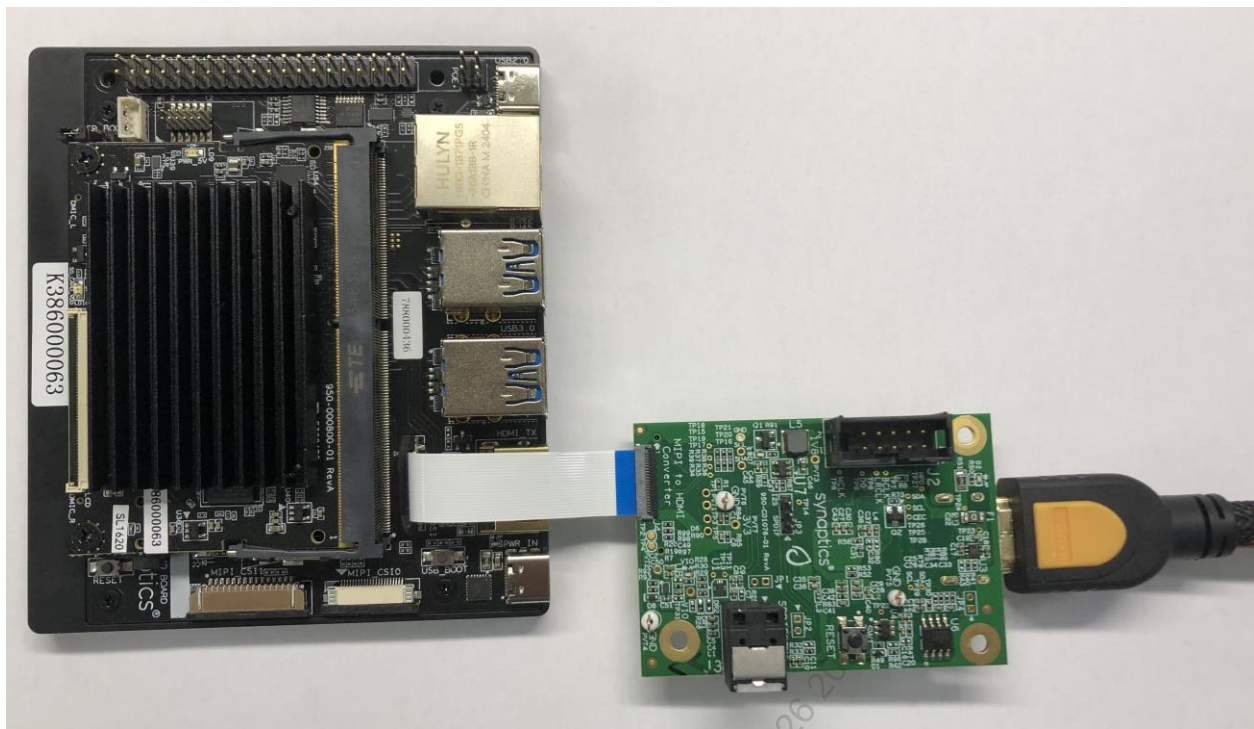


Figure 4. Complete connection with MIPI to HDMI converter board (top view)

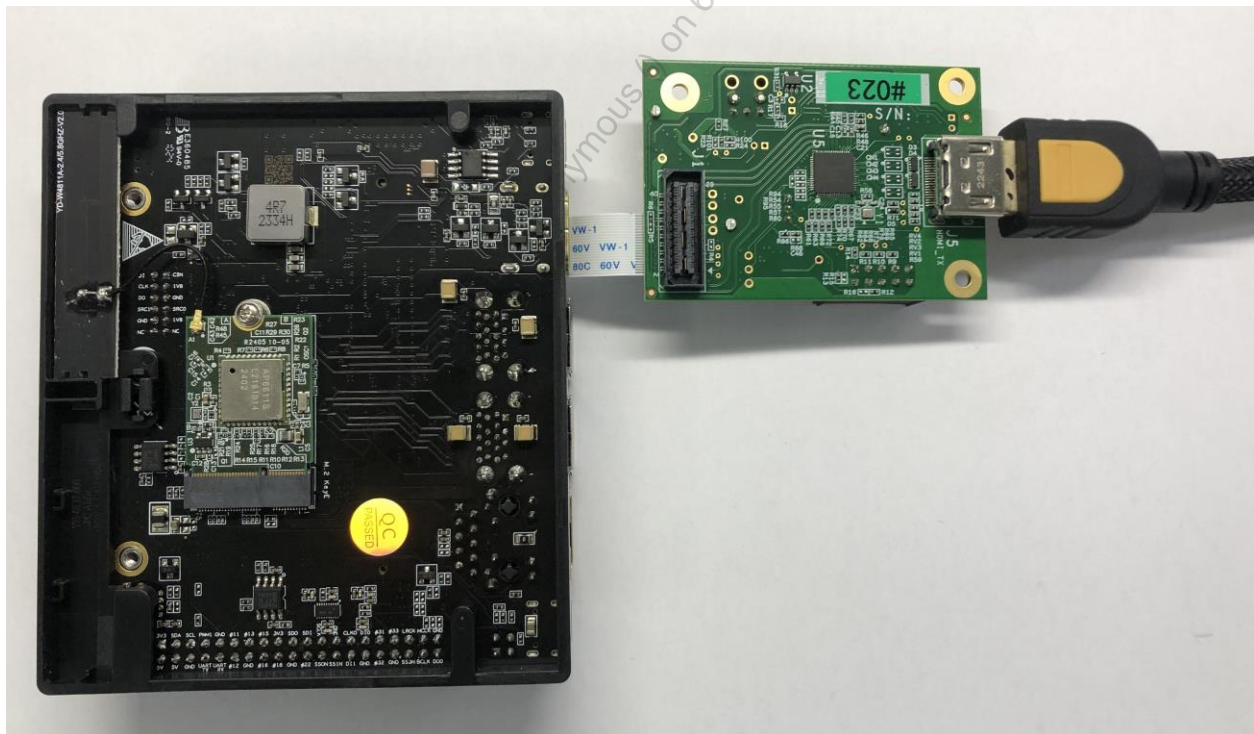


Figure 5. Complete connection with MIPI to HDMI converter board (bottom view)

## 1.5. Basic information of MIPI DSI to HDMI Conversion

- The Synaptics DSI to HDMI converter board, featuring the Lontium LT9611 converter, requires auxiliary wire connections for HDMI audio..
- The HDMI output supports resolutions up to 4K2K at 30fps or 1080p at 60fps..

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## 2. References

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- *Astra Machina Foundation Series Quick Start Guide* (PN: 511-001404-01)
- *Astra Machina SL1620 Developer Kit User Guide* (PN: 511-001407-01)
- *Astra Machina SL1640 Developer Kit User Guide* (PN: 511-001405-01)
- *Astra Machina SL1680 Developer Kit User Guide* (PN: 511-001403-01)
- *Synaptics DSI to HDMI converter board* (PN: 730-C01076-01)

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### 3. Revision History

Revision	Description
A	Initial release
B	Minor correction to cross-reference links in section 1.4 (Making the Connections).
C	Minor update to latest template and corrected document title.

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