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.
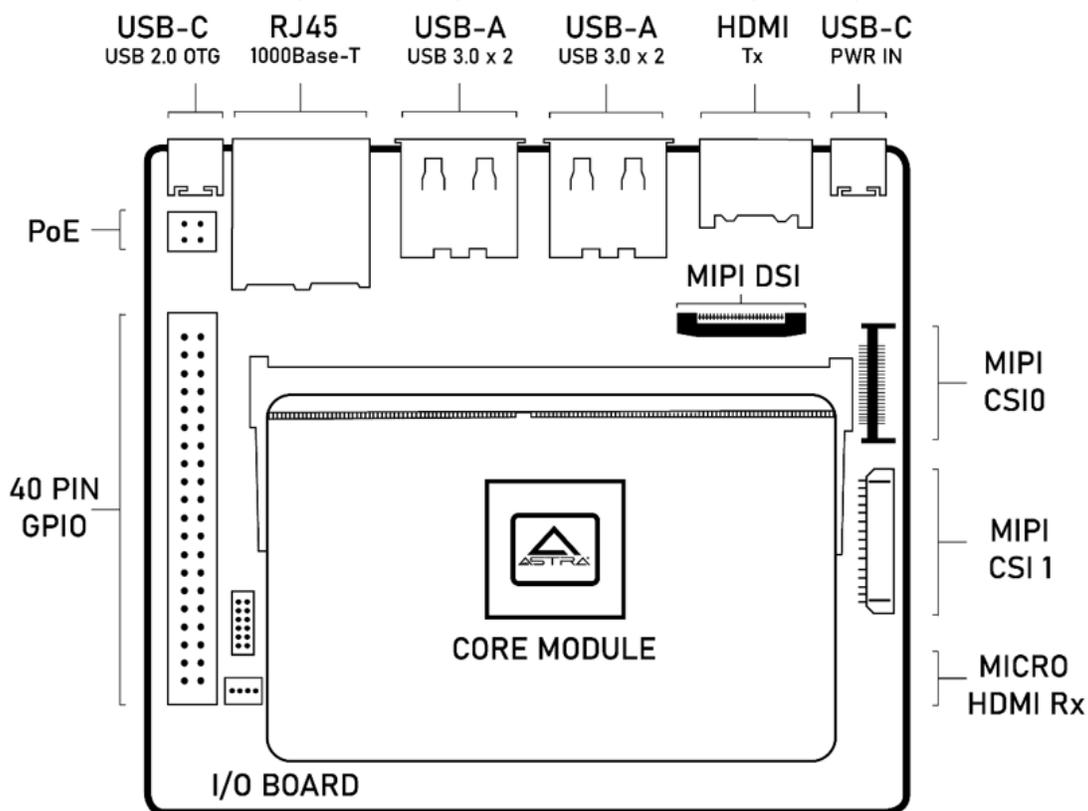

Figure 1. Overview of Astra Machina Foundation Series

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.
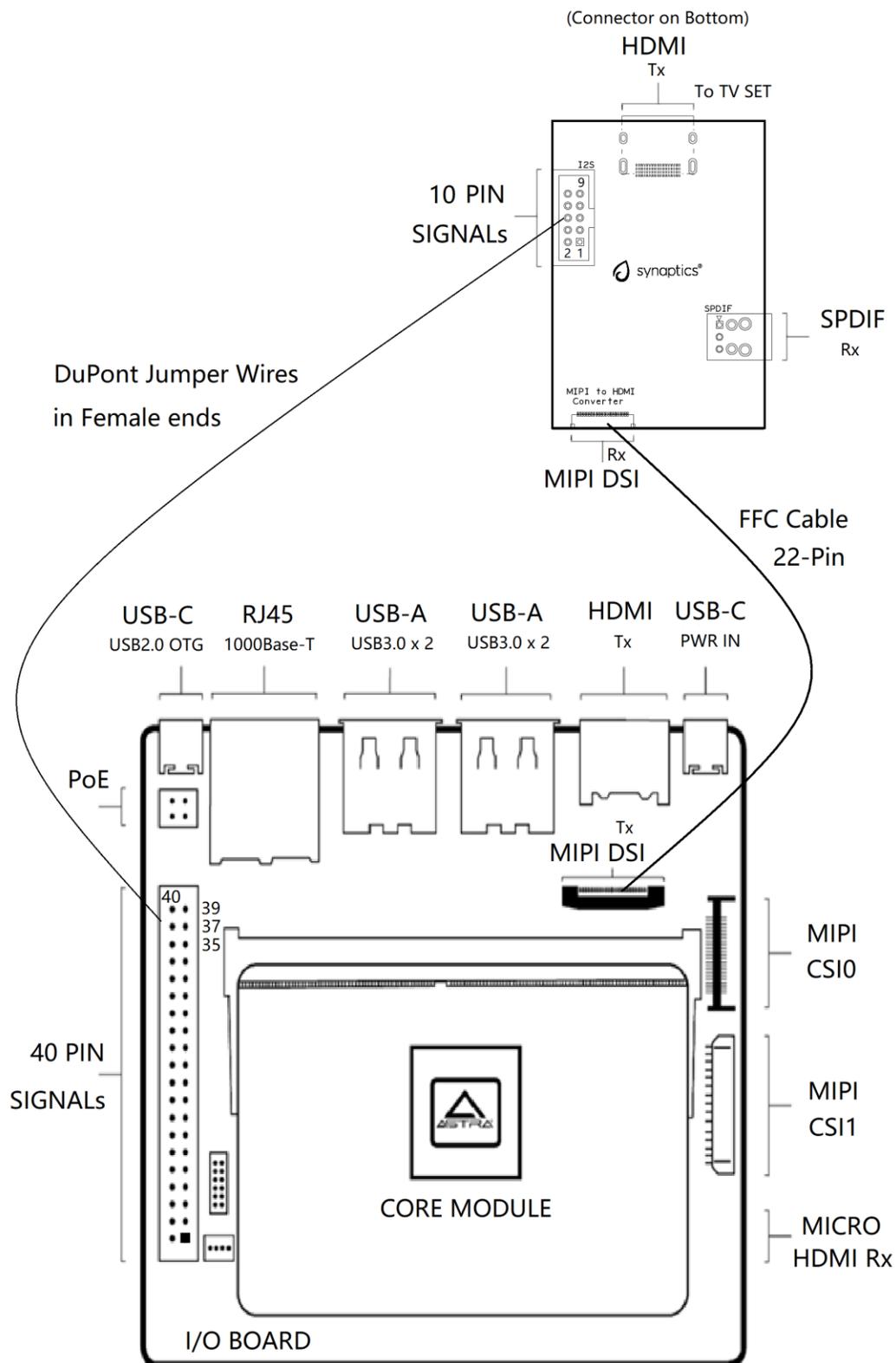
1.3. Connection Block Diagram

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.

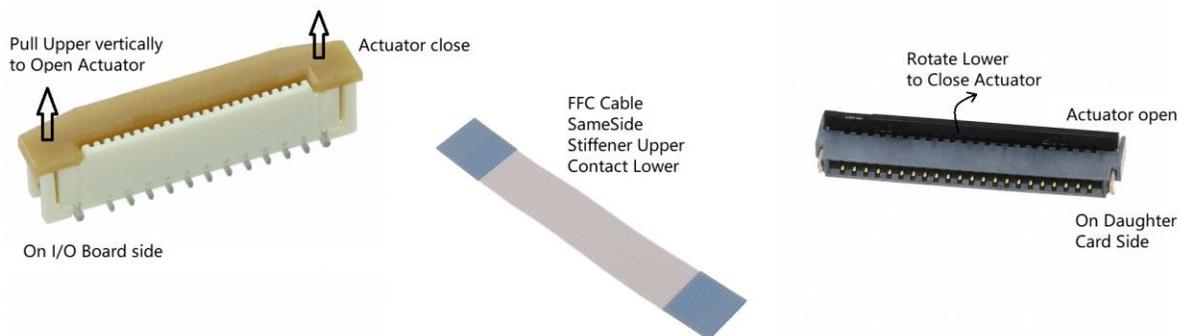| Astra I/O Board	Signals	Converter Board
40 PIN#		10 PIN#
35	I2S_LRCK	5
37	I2S_MCLK	9
38	I2S_BCLK	7
40	I2S_DATA	3
39	GND	8
34	GND	6

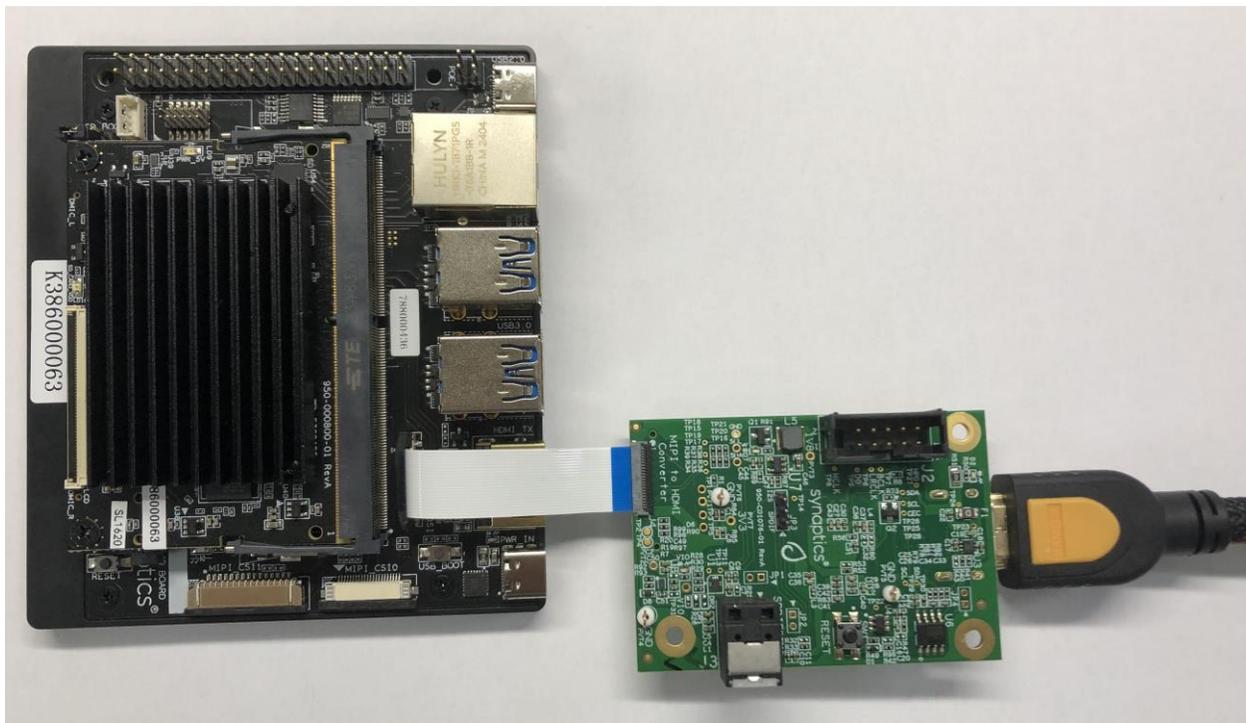*Figure 3. Connector Actuator Status & FFC cable side*

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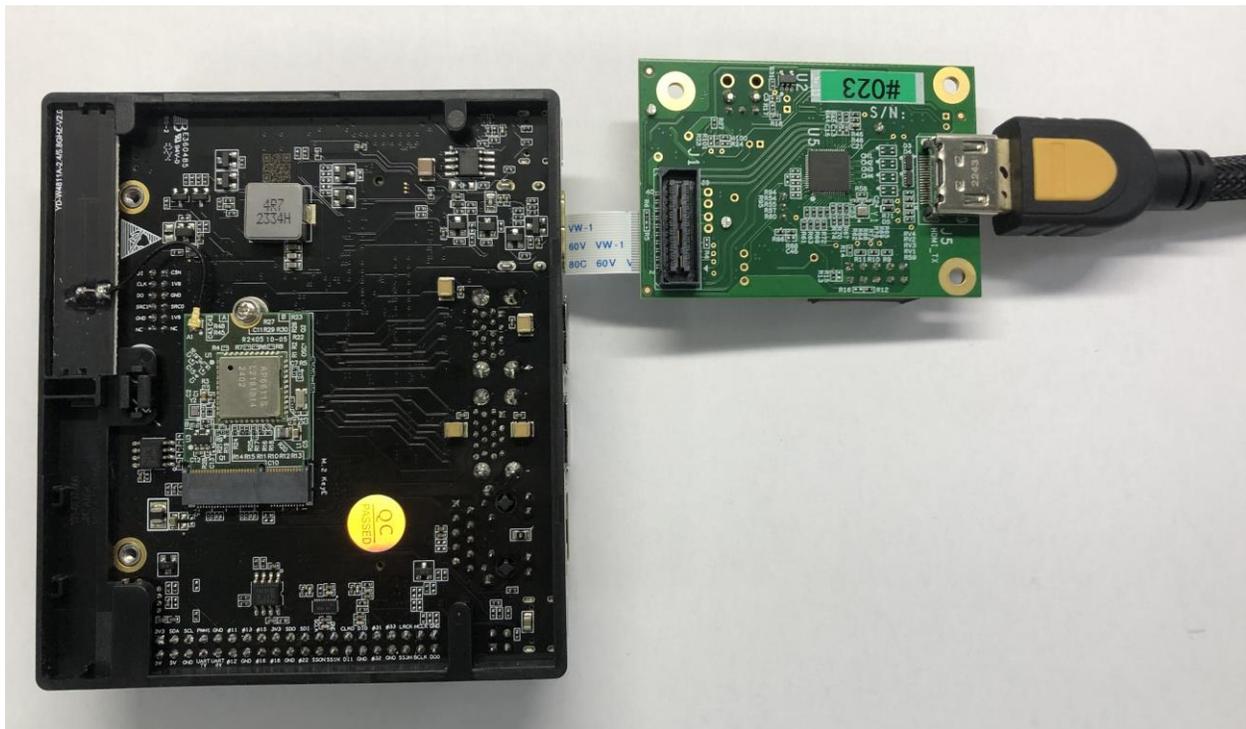

Figure 5. Complete connection with MIPI to HDMI converter board (bottom view)

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..

2. References

- *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)

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.