

# Colibri iMX8X DSI to HDMI Adapter

## Datasheet



## Revision History

| Date           | Doc. Rev. | Board Version | Changes                                                                                                                                                                                                                                                          |
|----------------|-----------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07-December-18 | Rev. 1.0  | V1.0          | Initial document release                                                                                                                                                                                                                                         |
| 16-April-19    | Rev. 1.1  | V1.1          | Block diagram and product pictures updated                                                                                                                                                                                                                       |
| 26-October-22  | Rev. 1.2  | V1.1          | Renamed document from “DSI to HDMI Adapter” to “Colibri iMX8X DSI to HDMI Adapter”<br>Section 1.1: Purpose of the Datasheet added<br>Section 2.5: Information about FFC cables added<br>Updated email and main office addresses<br>Minor changes and corrections |
| 14-April-23    | Rev. 1.3  | V1.1          | Section 6.1: Fixed incorrect section title                                                                                                                                                                                                                       |

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## 1. Introduction

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The DSI to HDMI Adapter is an add-on board for the Colibri iMX8 computer-on-module which uses MIPI-DSI Interface to provide a HDMI data output.

The DSI to HDMI Adapter uses Lontium Semiconductor LT8912B MIPI® DSI to HDMI bridge. It features a single-channel MIPI® D-PHY receiver front-end configuration with 4 data lanes per channel operating at 1.5Gbps per data lane and a maximum input bandwidth of 6Gbps.

The bridge provides a HDMI 1.4 standard data output with a resolution up to 60Hz 1080p 8-bit.

The DSI to HDMI Adapter can be connected to the MIPI® DSI connector of the Colibri iMX8 computer-on-module using a 30 way 0.5mm pitch FFC cable and to Colibri carrier boards which features the FFC HDMI input connector.

### 1.1. Purpose of the Datasheet

The datasheet represents the hardware capabilities of the Colibri iMX8X DSI to HDMI Adapter. For information on the actual features supported by software, please refer to the relevant SoM product page on the Toradex website.

### 1.2. Reference Documents

For detailed technical information on the suitable computer modules and other reference documents, please refer the following sections:

#### 1.2.1 Colibri iMX8X Computer Module Datasheet

The Colibri iMX8X datasheet can be downloaded here:

<https://docs.toradex.com/105670-colibri-imx8x-datasheet.pdf>

#### 1.2.2 Toradex Developer Website

<http://developer.toradex.com/>

#### 1.2.3 LT8912B MIPI® DSI to HDMI Bridge Product Brief

[http://www.lontiumsemi.com/uploadfiles/pdf/LT8912\\_Product\\_Brief.pdf](http://www.lontiumsemi.com/uploadfiles/pdf/LT8912_Product_Brief.pdf)

## 2. Features

### 2.1. One-Channel MIPI® DSI Receiver

- Compliant with D-PHY1.1 and DSI1.02
- 1 clock lane and 1~4 configurable data lanes
- 80Mb/s~1.5Gb/s per data lane
- Data lane swappable and polarity swappable
- Internal Rterm calibration w/i less than 5% error
- 2-bit programmable equalization
- Only Non-Burst Mode supported

### 2.2. HDMI Transmitter

- Support HDMI1.4 standard
- Up to 60Hz 1080p 8-bit HDMI output
- 7-bit automatic or manual output swing calibration
- 3-bit programmable de-emphasis

### 2.3. Hardware Architecture Block Diagram

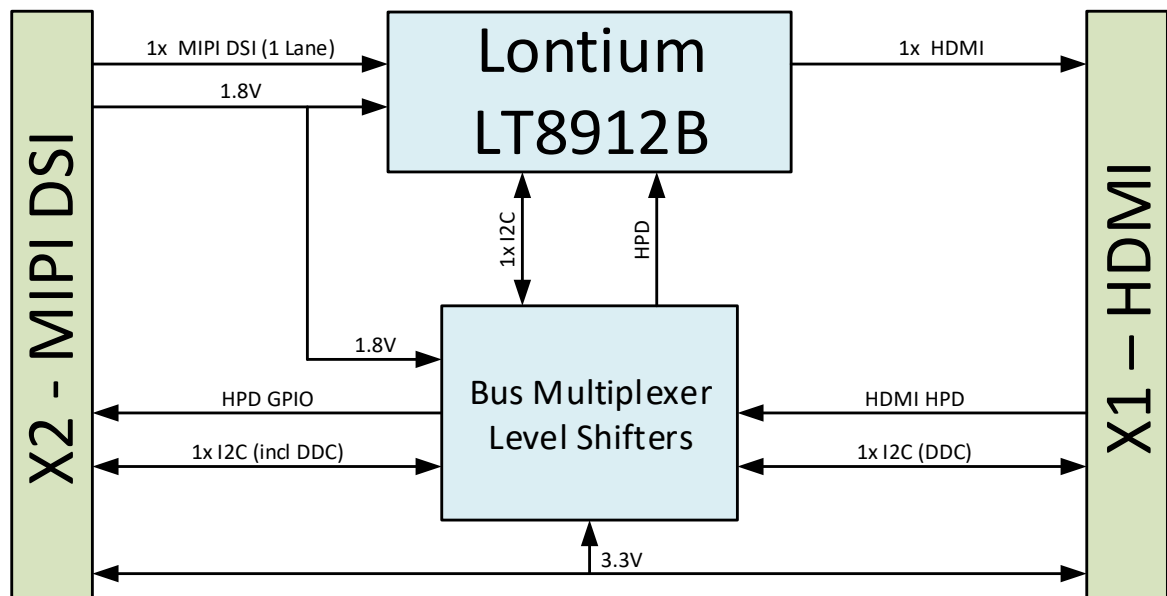


Fig.1 DSI to HDMI Adapter Hardware Architecture

## 2.4. Physical Drawings

### 2.4.1 Top Side Connector

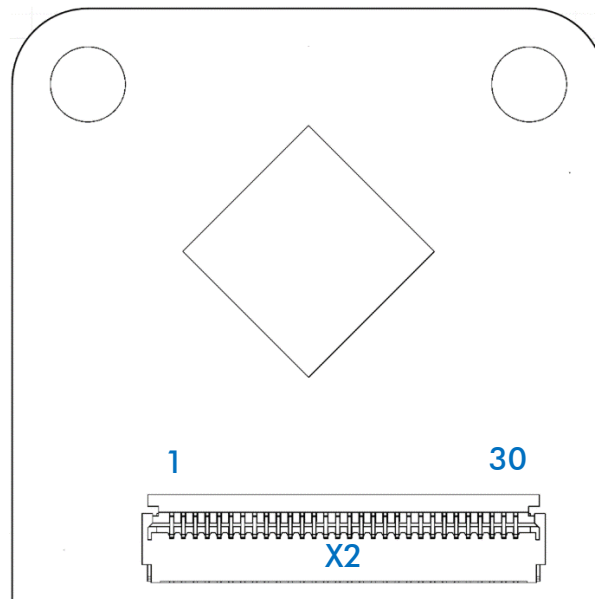


Fig.2 DSI to HDMI Adapter – Top Side

| Ref | Description                   | Remarks |
|-----|-------------------------------|---------|
| X2  | MIPI® DSI Interface Connector |         |

### 2.4.2 Bottom Side Connector

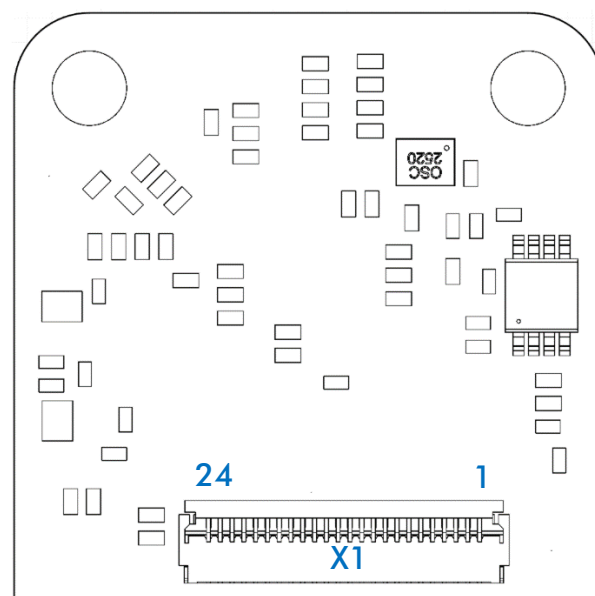


Fig.3 DSI to HDMI Adapter – Bottom Side

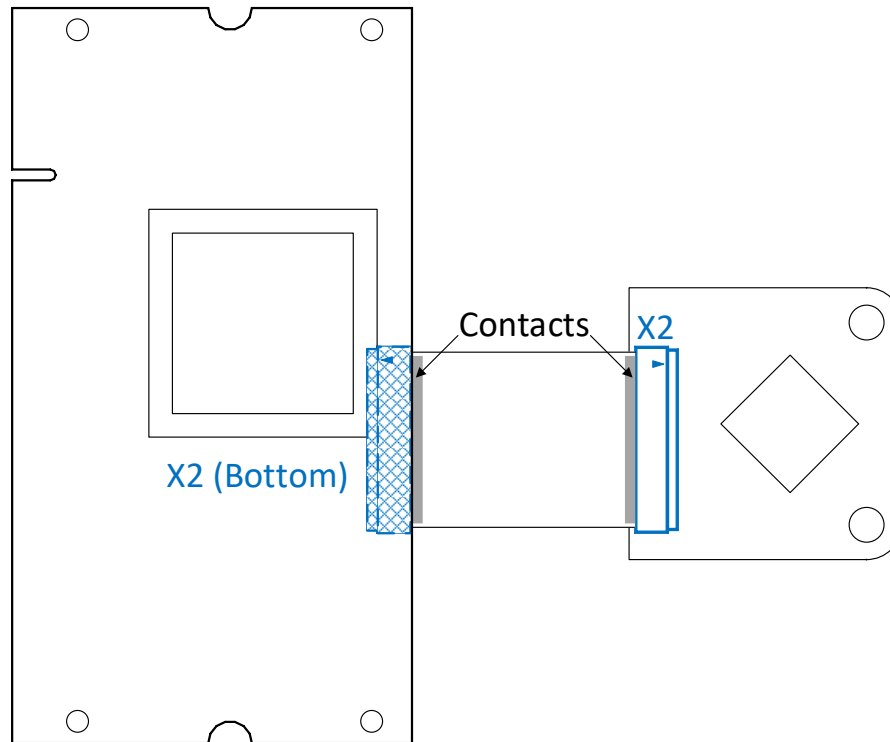
| Ref | Description              | Remarks |
|-----|--------------------------|---------|
| X1  | HDMI Interface Connector |         |

## 2.5. Hardware Setup

The Colibri iMX8X DSI to HDMI Adapter is delivered with the following FFC cables:

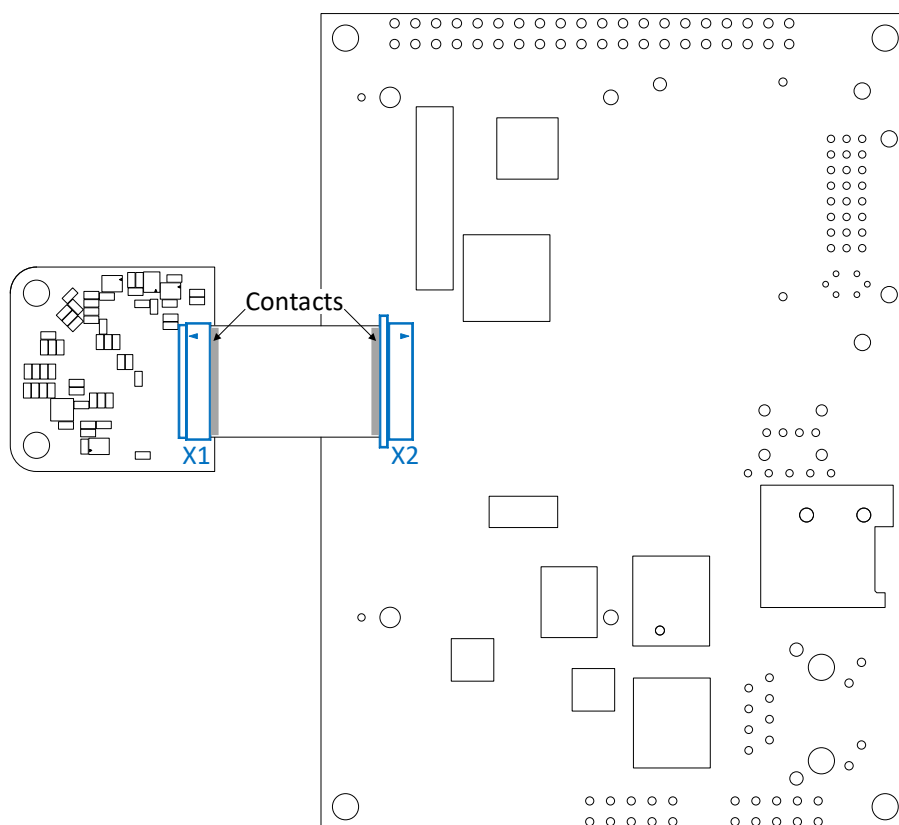
| FFC Cable Description      | Colibri iMX8X DSI to HDMI Adapter Connector | Interface |
|----------------------------|---------------------------------------------|-----------|
| 30 pos., 51mm, 0.5mm pitch | X2                                          | MIPI® DSI |
| 24 pos., 57mm, 0.5mm pitch | X1                                          | HDMI      |

### 2.5.1 MIPI® DSI Interface with Colibri iMX8X



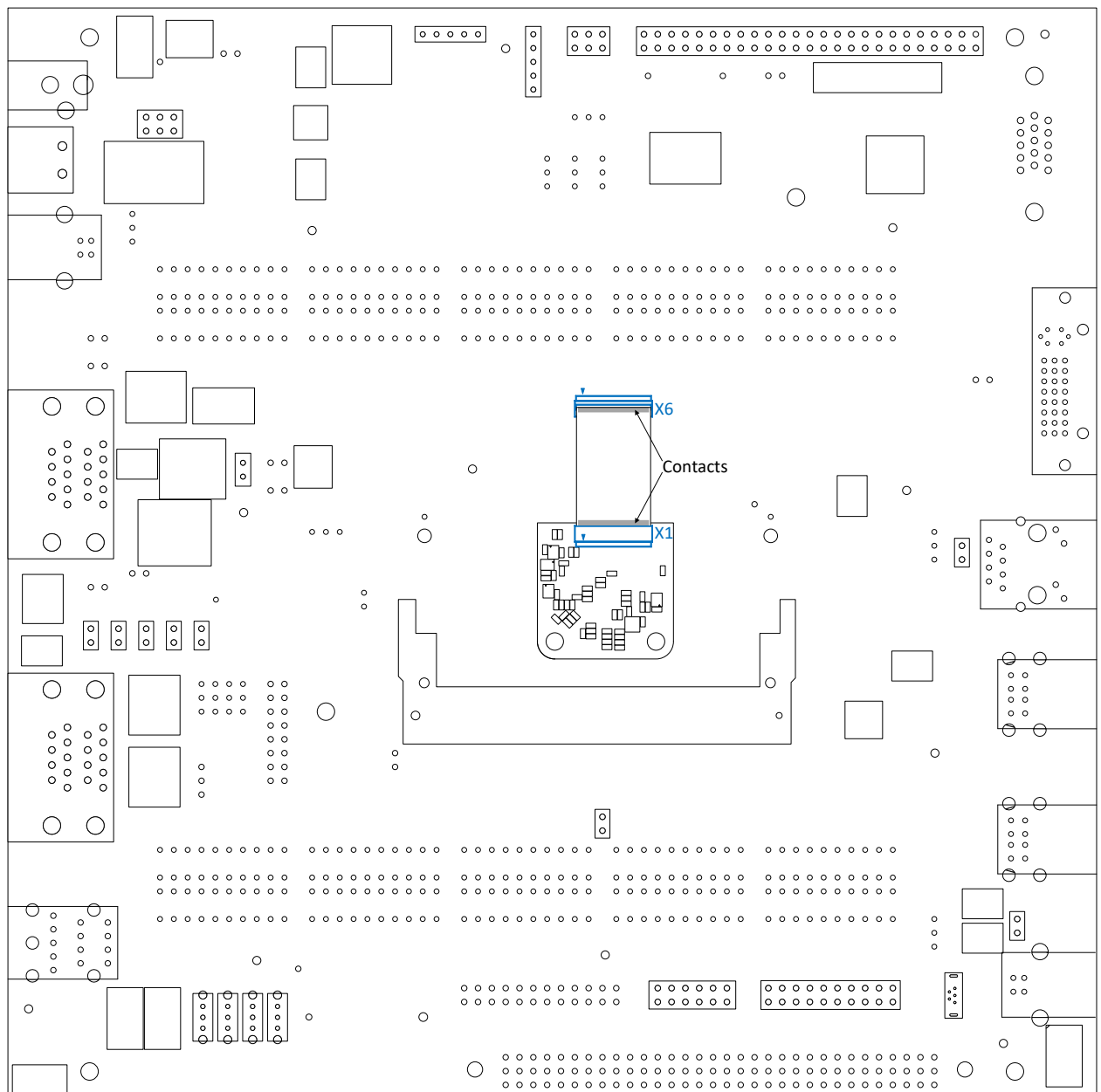
**Fig.4 Connection with the Colibri iMX8X Modules**

## 2.5.2 HDMI Interface with Iris Carrier Board



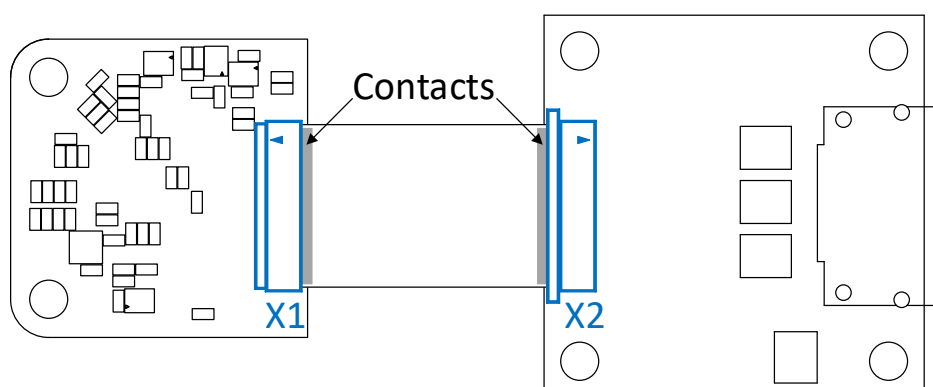
**Fig.5 Connection with the Iris Carrier Board**

### 2.5.3 HDMI Interface with the Colibri Evaluation Board



**Fig.6 Connection with the Colibri Evaluation Board**

### 2.5.4 HDMI Interface with the Colibri HDMI Adapter



**Fig.7 Connection with the Colibri HDMI Adapter**

## 3. interface Description

### 3.1. HDMI Connector (X1)

Manufacturer: Würth - 687124182122

Type: FFC connector, top/bottom side contact, 24 pin, pitch 0.5mm

| Pin | Name           | Description                       | I/O Type | Pullup/Pulldown |
|-----|----------------|-----------------------------------|----------|-----------------|
| 1   | GND            | Ground                            |          |                 |
| 2   | TMDS_CLK_P     | HDMI Differential Clock Positive  | O        |                 |
| 3   | TMDS_CLK_N     | HDMI Differential Clock Negative  | O        |                 |
| 4   | GND            | Ground                            |          |                 |
| 5   | TMDS_DATA0_P   | HDMI Differential Data 0 Positive | O        |                 |
|     | TMDS_DATA0_N   | HDMI Differential Data 0 Negative | O        |                 |
| 7   | GND            | Ground                            |          |                 |
| 8   | TMDS_DATA1_P   | HDMI Differential Data 1 Positive | O        |                 |
| 9   | TMDS_DATA1_N   | HDMI Differential Data 1 Negative | O        |                 |
| 10  | GND            | Ground                            |          |                 |
| 11  | TMDS_DATA2_P   | HDMI Differential Data 2 Positive | O        |                 |
| 12  | TMDS_DATA2_N   | HDMI Differential Data 2 Negative | O        |                 |
| 13  | 3V3            | Power                             |          |                 |
| 14  | HOTPLUG_DETECT | Hot Plug Detect                   | I        | 100K to GND     |
| 15  | DDC_SCL        | Display Data Channel Clock        | I/O      |                 |
| 16  | DDC_SDA        | Display Data Channel Data         | I/O      |                 |
| 17  | GND            | Ground                            |          |                 |
| 18  | VGA_RED        | Not connected                     |          |                 |
| 19  | GND            | Ground                            |          |                 |
| 20  | NC             | Not connected                     |          |                 |
| 21  | GND            | Ground                            |          |                 |
| 22  | NC             | Not connected                     |          |                 |
| 23  | NC             | Not connected                     |          |                 |
| 24  | NC             | Not connected                     |          |                 |

### 3.2. MIPI® DSI Interface Connector (X2)

Manufacturer: Würth – 687130182122

Type: FFC connector, top/bottom side contact, 30 pin, pitch 0.5mm

| Pin | Colibri iMX8X Signal Name | Description                                | I/O Type | Pullup/Pulldown |
|-----|---------------------------|--------------------------------------------|----------|-----------------|
| 1   | MIPI_DSI0_CLK_N           | MIPI® DSI Interface 1 clock Negative       | I        |                 |
| 2   | MIPI_DSI0_CLK_P           | MIPI® DSI Interface 1 clock Positive       | I        |                 |
| 3   | GND                       | Ground                                     |          |                 |
| 4   | MIPI_DSI0_DATA0_N         | MIPI® DSI Interface 1 data lane 1 Negative | I        |                 |
| 5   | MIPI_DSI0_DATA0_P         | MIPI® DSI Interface 1 data lane 1 Positive | I        |                 |
| 6   | GND                       | Ground                                     |          |                 |
| 7   | MIPI_DSI0_DATA1_N         | MIPI® DSI Interface 1 data lane 2 Negative | I        |                 |
| 8   | MIPI_DSI0_DATA1_P         | MIPI® DSI Interface 1 data lane 2 Positive | I        |                 |
| 9   | GND                       | Ground                                     |          |                 |
| 10  | MIPI_DSI0_DATA2_N         | MIPI® DSI Interface 1 data lane 3 Negative | I        |                 |
| 11  | MIPI_DSI0_DATA2_P         | MIPI® DSI Interface 1 data lane 3 Positive | I        |                 |
| 12  | GND                       | Ground                                     |          |                 |
| 13  | MIPI_DSI0_DATA3_N         | MIPI® DSI Interface 1 data lane 4 Negative | I        |                 |
| 14  | MIPI_DSI0_DATA3_P         | MIPI® DSI Interface 1 data lane 4 Positive | I        |                 |
| 15  | MIPI_DSI0_I2C0_SCL        | MIPI® DSI I <sup>2</sup> C port - Clock    | I/O      | 4.7K to +3.3V   |
| 16  | MIPI_DSI0_I2C0_SDA        | MIPI® DSI I <sup>2</sup> C port - Data     | I/O      | 4.7K to +3.3V   |
| 17  | NC                        | Not connected                              |          |                 |
| 18  | NC                        | Not connected                              |          |                 |
| 19  | 3.3V                      | Power                                      | O        |                 |
| 20  | NC                        | Not connected                              |          |                 |
| 21  | NC                        | Not connected                              |          |                 |
| 22  | 3.3V                      | Power                                      |          |                 |
| 23  | NC                        | Not connected                              |          |                 |
| 24  | NC                        | Not connected                              |          |                 |
| 25  | MIPI_DSI1_GPIO0_00        | GPIO                                       | O        | 10K to +3.3V    |
| 26  | NC                        | Not connected                              |          |                 |
| 27  | NC                        | Not connected                              |          |                 |
| 28  | 1.8V                      | Power                                      |          |                 |
| 29  | NC                        | Not connected                              |          |                 |
| 30  | NC                        | Not connected                              |          |                 |

## 4. Electrical Characteristics

### 4.1. Absolute Maximum Ratings

| Item / Details                                    | Specifications | Remarks |
|---------------------------------------------------|----------------|---------|
| <b>IC1 1.1.3 LT8912B MIPI® DSI to HDMI Bridge</b> |                |         |
| 1.8V Power Supply Voltage                         | -0.3 to 2.2V   |         |
| <b>Connector X1 (3.3V)</b>                        |                |         |
| Max. Voltage (Pin 13)                             | 3.6V           |         |
| <b>Connector X2 (1.8V, 3.3V)</b>                  |                |         |
| Max. Voltage (Pin 19, 22)                         | 3.6V           |         |
| Max. Voltage (Pin 28)                             | 2.2V           |         |

### 4.2. Power Consumption

| Conditions | Power Consumption | Unit |
|------------|-------------------|------|
| 1080P 60Hz | ~160              | mA   |
| 720P 60Hz  | ~120              | mA   |
| 480P 60Hz  | ~90               | mA   |

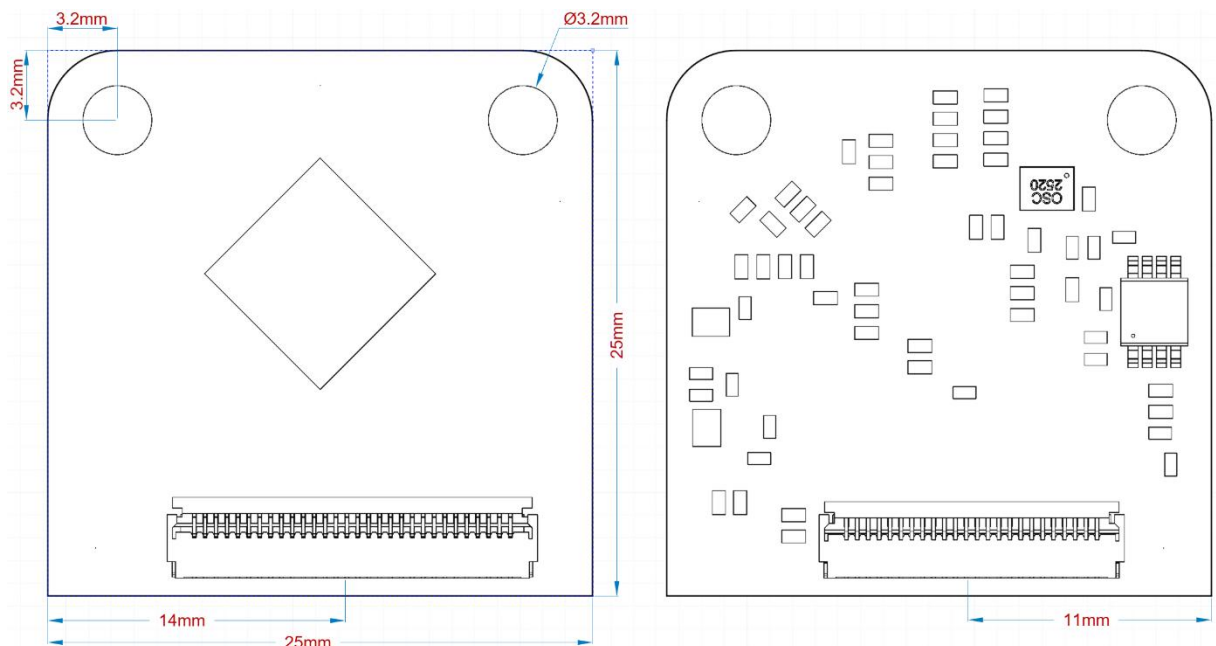
## 5. Temperature Range

### 5.1. Operating Temperature Range

- 40 to +85 °C

## 6. Mechanical Data

### 6.1. Colibri iMX8X DSI to HDMI Adapter Dimensions - Top and Bottom Sides



**Fig.8 DSI to HDMI Adapter Dimensions – Top and Bottom Sides**  
All dimensions are in millimeters (mm)

## 7. Design Data

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The design data for the Toradex carrier boards and adapter boards are freely available in the Altium Designer format. The design data includes schematics, layout, and component libraries.

To download the board design data, please use the web-link below:

<http://developer.toradex.com/carrier-board-design/reference-designs>

## 8. Product Compliance

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Up-to-date information about product compliance such as RoHS, CE, UL-94, Conflict Mineral, REACH etc. can be found on our website at: <http://www.toradex.com/support/product-compliance>

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