Toradex
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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

Contents

1. Introduction

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. Reference Documents

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

1.1.1 Colibri iMX8X Computer Module Datasheet

The Colibri iMX8X datasheet can be downloaded here:

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

1.1.2 Toradex Developer Website

http://developer.toradex.com/

1.1.3 LT8912B MIPI® DSI to HDMI Bridge Product Brief

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

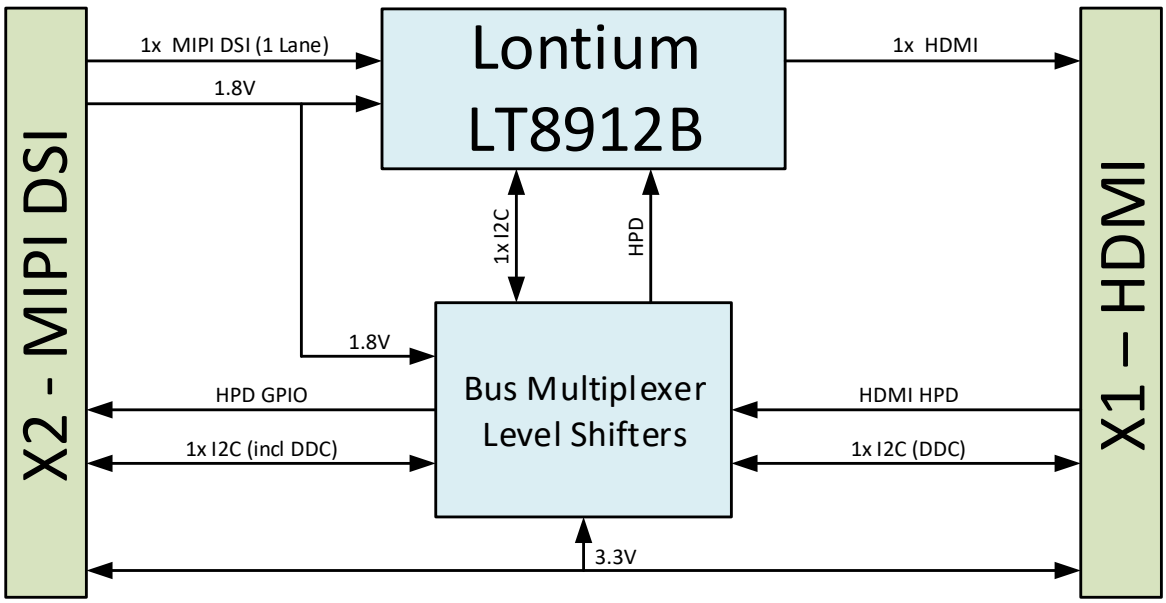

Fig.1 DSI to HDMI Adapter Hardware Architecture

2.4. Physical Drawings

2.4.1 Top Side Connector

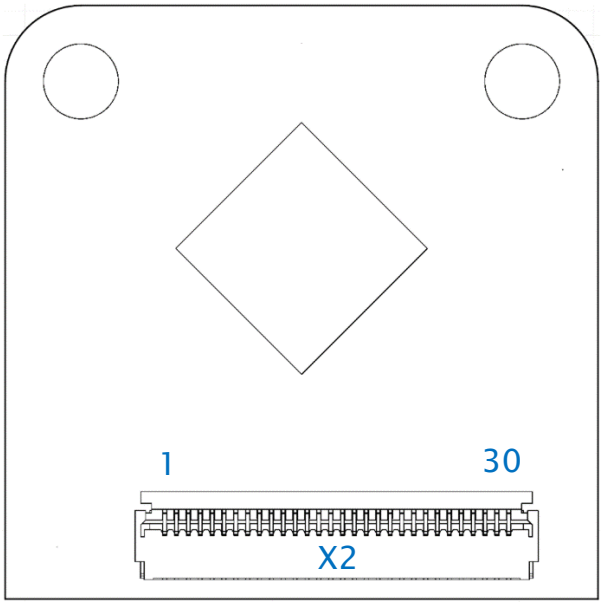

Fig.2 DSI to HDMI Adapter – Top Side

Ref	Description	Remarks
X2	MIPI® DSI Interface Connector	

2.4.2 Bottom Side Connector

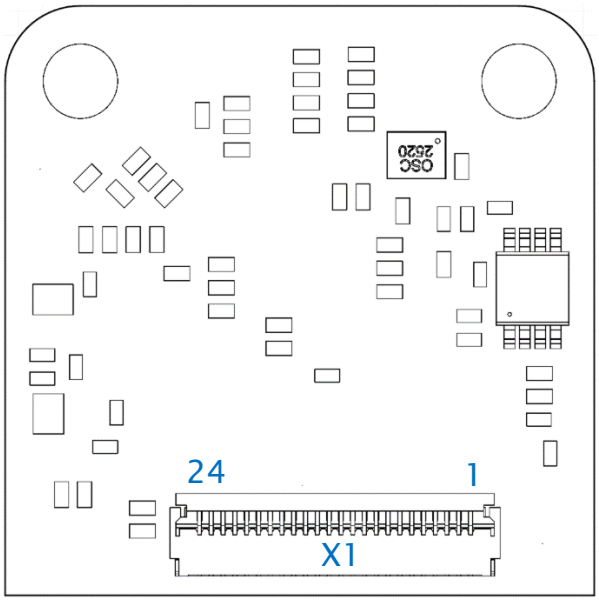

Fig.3 DSI to HDMI Adapter – Bottom Side

Ref	Description	Remarks
X1	HDMI Interface Connector	

2.5. Hardware Setup

2.5.1 MIPI® DSI Interface with Colibri iMX8X

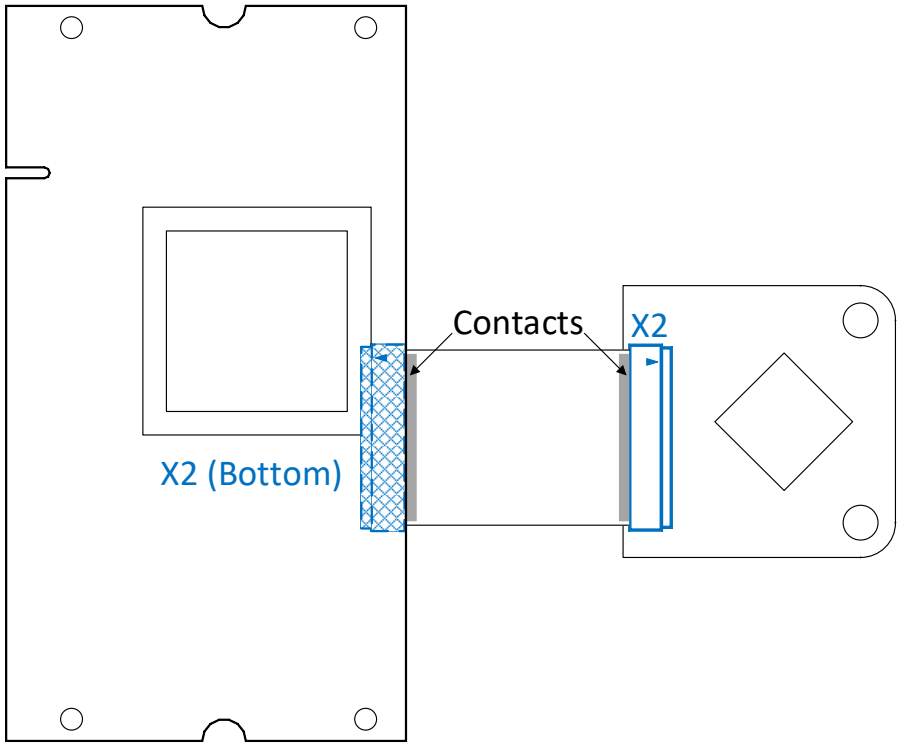

Fig.4 Connection with the Colibri iMX8X Modules

2.5.2 HDMI Interface with Iris Carrier Board

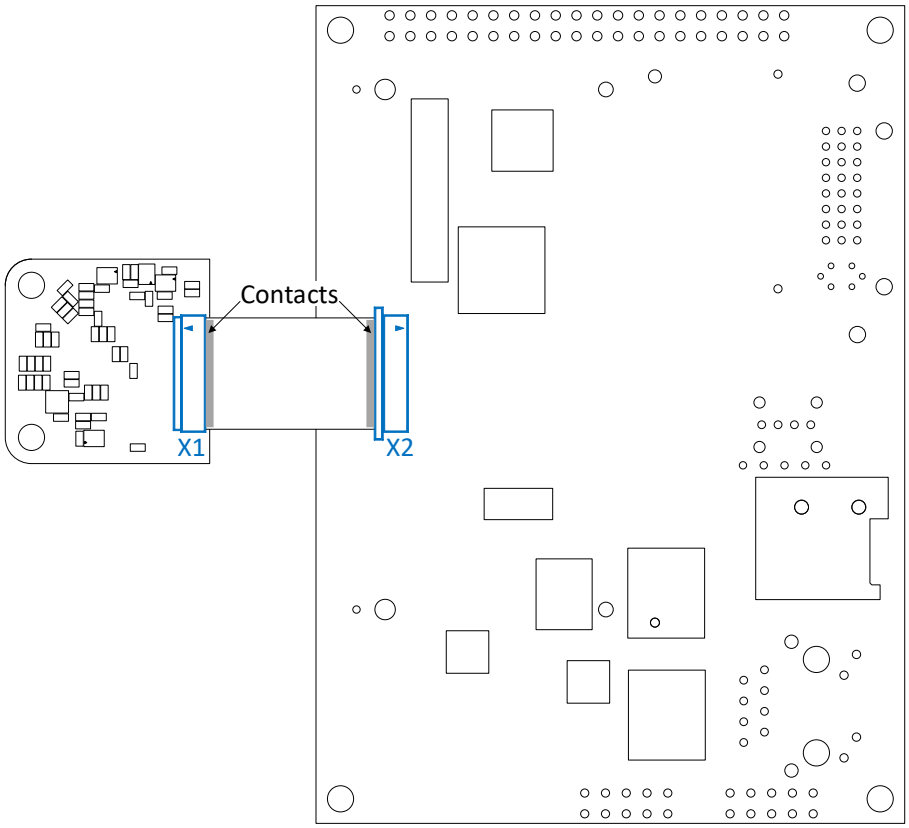

Fig.5 Connection with the Iris Carrier Board

2.5.3 HDMI Interface with the Colibri Evaluation Board

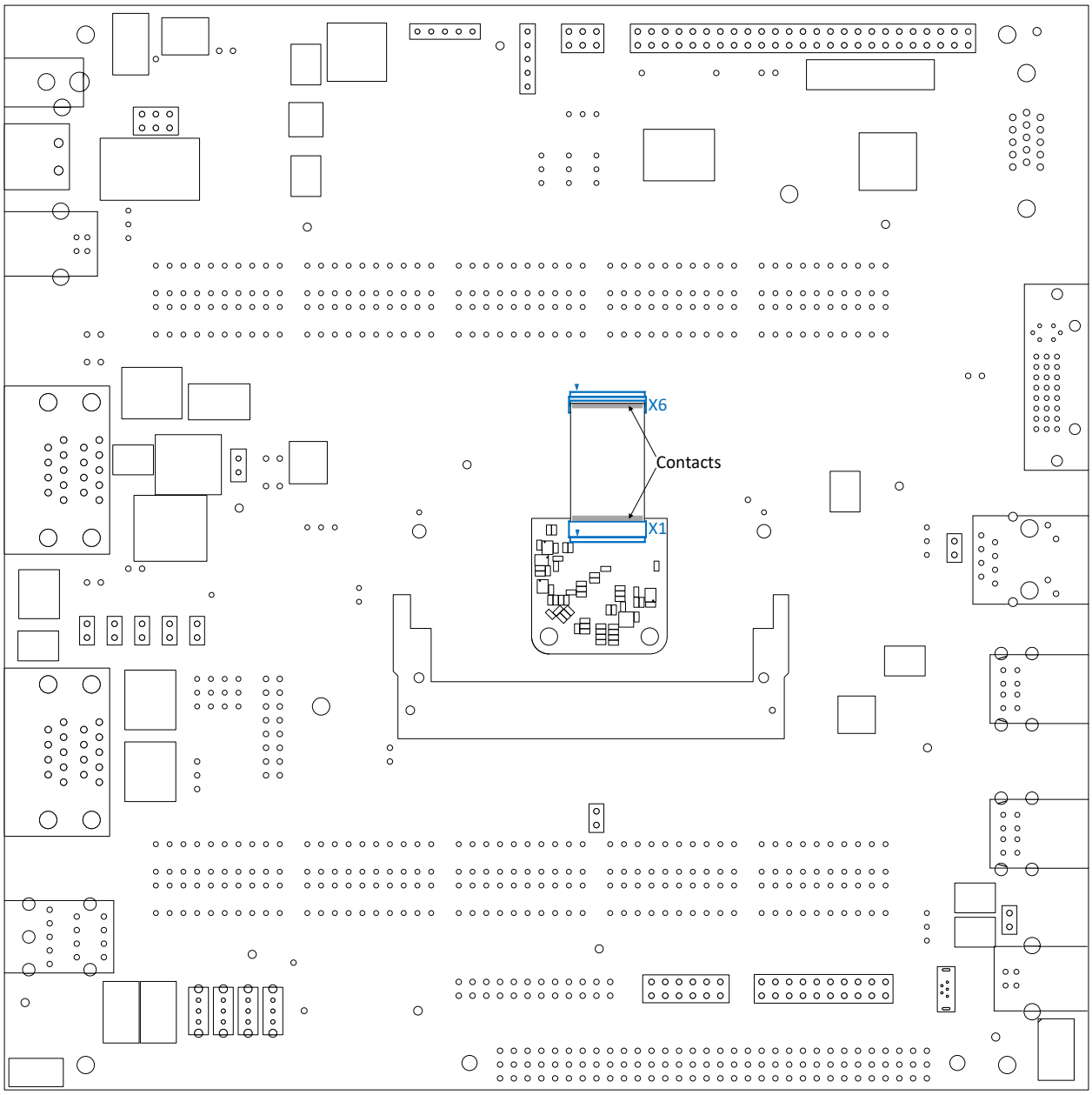

Fig.6 Connection with the Colibri Evaluation Board

2.5.4 HDMI Interface with the Colibri HDMI Adapter

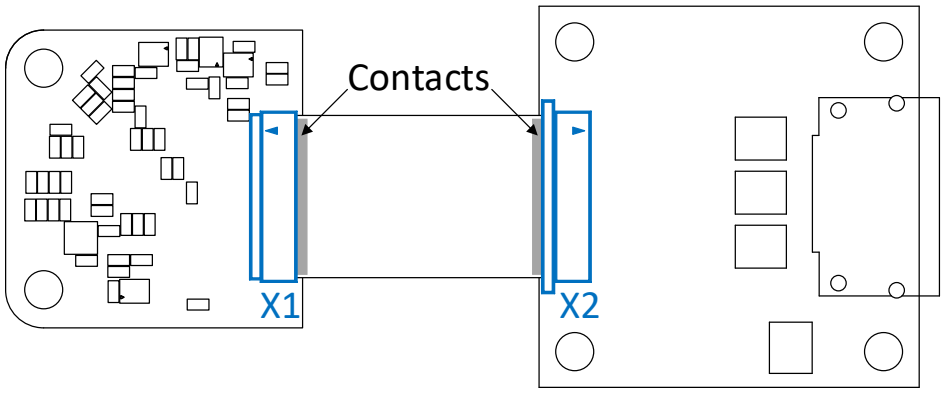

Fig.7 Connection with the Colibri HDMI Adapter

3. Interface Description

3.1. HDMI Connector (X1)

Manufacturer: Wurth - 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: Wurth – 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^2C port - Clock	I/O	4.7K to +3.3V
16	MIPI_DSI0_I2C0_SDA	MIPI® DSI I^2C 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		

Pin	Colibri iMX8X Signal Name	Description	I/O Type	Pullup/Pulldown
29	NC	Not connected		
30	NC	Not connected		

Colibri carrier board

4. Electrical Characteristics

4.1. Absolute Maximum Ratings

Item / Details	Specifications	Remarks
IC1 1.1.3 LT8912B MIPI® DSI to HDMI Bridge		
1.8V Power Supply Voltage	-0.3 to 2.2V	
Connector X1 (3.3V)		
Max. Voltage (Pin 13)	3.6V	
Connector X2 (1.8V, 3.3V)		
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. CSI Camera Module 5MP OV5640 Dimensions - Top and Bottom Sides

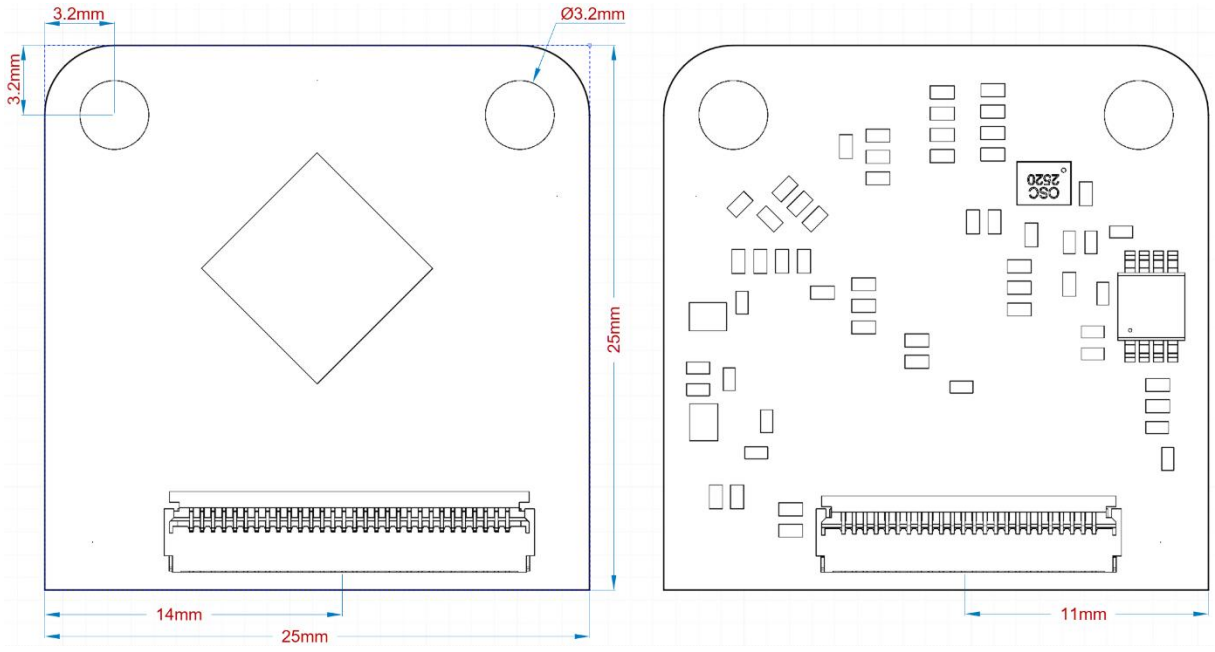

Fig.8 DSI to HDMI Adapter Dimensions – Top and Bottom Sides
All dimensions are in millimeters (mm)

7. Design Data

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

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