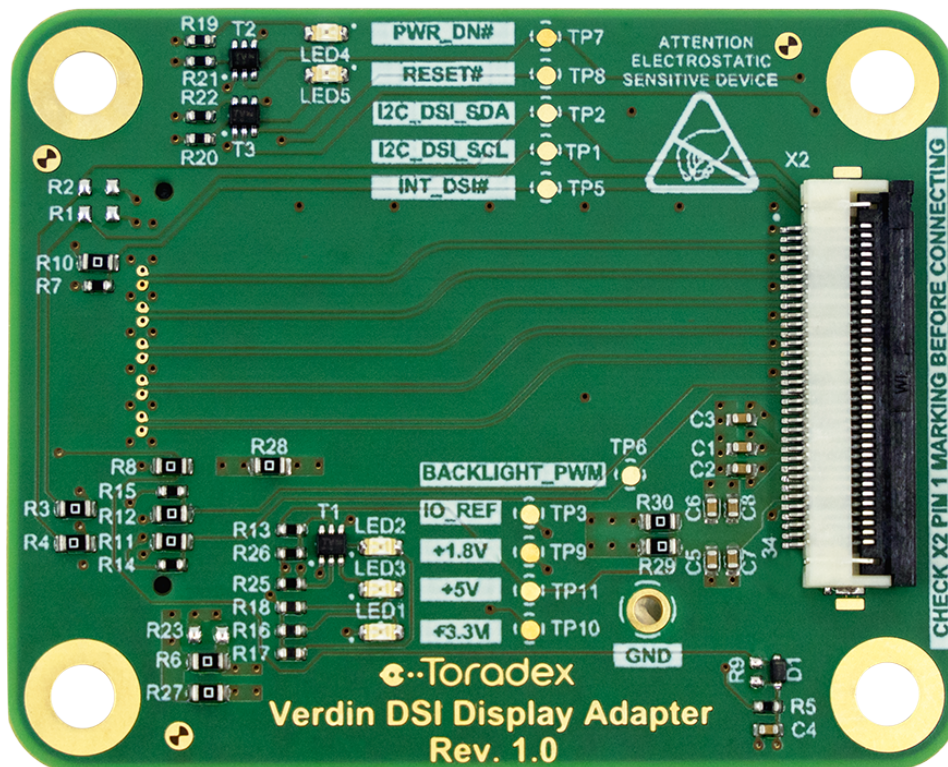


Toradex DSI Display Adapter V1.0

HW Datasheet



Revision History

Document Revisions

Date	Doc. Revision	Product Version	Changes
09-Oct-2023	Rev. 1.0	V1.0	Initial release.
12-Dec-2024	Rev. 1.1	V1.0	Update the product name. Section 1.2.3 : Add Aquila Development Board compatibility.

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1 Introduction

The Toradex DSI Display Adapter is an add-on board for the Verdin Development Board, the Dahlia Carrier Board, and Aquila Development Board. which pass through MIPI DSI interface to FPC/FFC connector. The adapter can be used to connect displays with MIPI DSI interface to the Verdin carrier boards.

1.1 Purpose of Datasheet

The datasheet represents the hardware capabilities of the Toradex DSI Display 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 to the following sections:

1.2.1 Verdin Development Board V1.1 Datasheet

https://docs.toradex.com/109463-verdin_development_board_datasheet_v1.1.pdf

1.2.2 Dahlia Carrier Board V1.1 Datasheet

https://docs.toradex.com/109590-dahlia_datasheet_v1.1.pdf

1.2.3 Aquila Development Board

<https://developer.toradex.com/hardware/aquila-som-family/carrier-boards/aquila-development-board/>

1.2.4 Toradex Developer Website

<https://developer.toradex.com>

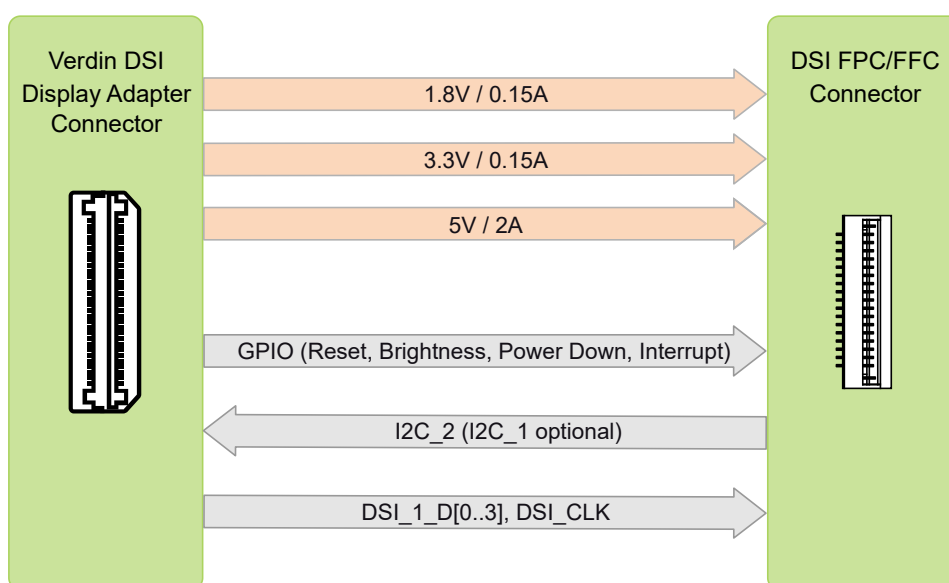
2 Features

2.1 Overview

The Toradex DSI Display Adapter features a 34-way FPC/FFC connector compatible with the Toradex MIPI DSI Display. The adapter also features LED indicators (see [Section 3.3](#) on page 10) and test points (see [Section 3.5](#) on page 12).

2.2 Block Diagram

Figure 1: Block Diagram



2.3 Connectors

The Toradex DSI Display Adapter features two connectors, X1 and X2:

Table 1: Connectors list

Ref.	Description	Remarks
X1	Verdin DSI Display Adapter Connector	
X2	MIPI-DSI FPC/FFC Connector	

X1 is located on the bottom of the adapter and connects to the carrier board, while X2 connects to the display via FPC/FFC cables (more information in [Section 2.4](#) on the following page).

See the connector locations in [Section 5.1](#) on page 14.

2.4 Hardware Setup

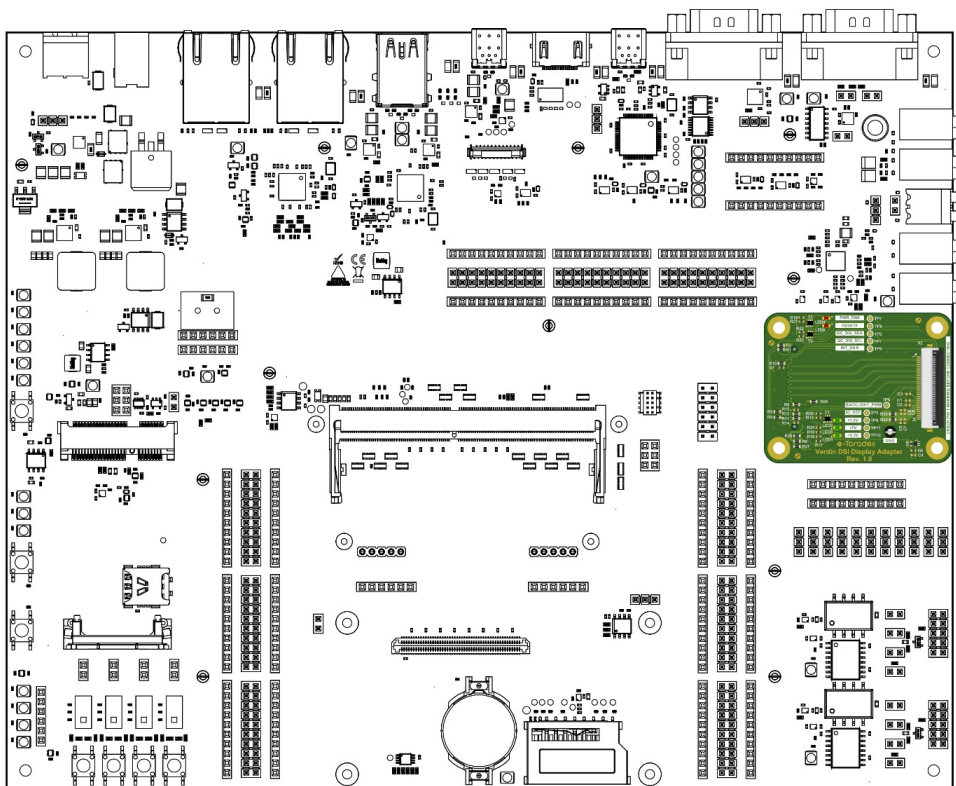
The Toradex DSI Display Adapter is delivered with the following FFC cables:

Table 2: FFC Cables

FFC cable description	Compatible connector	Interface
34 pos., 51mm, 0.5mm pitch, type A	X2	MIPI® DSI
34 pos., 51mm, 0.5mm pitch, type D	X2	MIPI® DSI

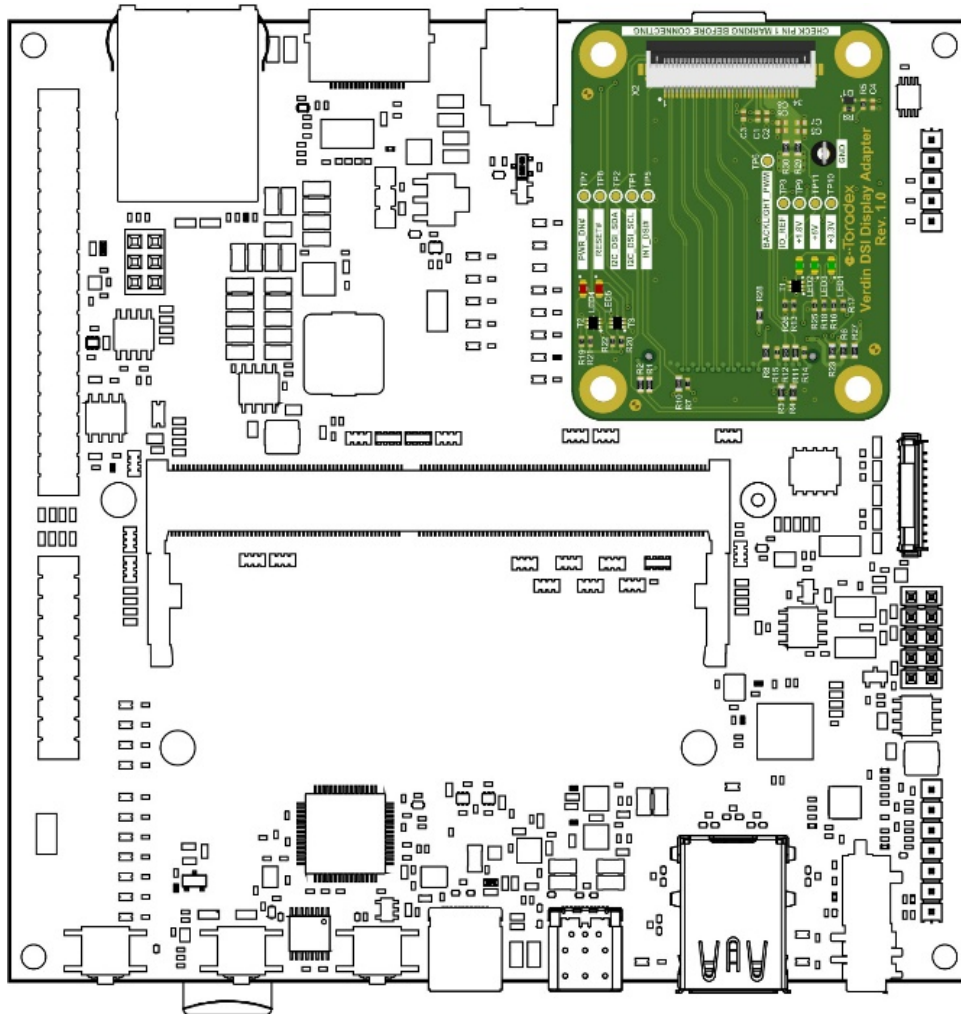
2.4.1 Installation on Verdin Development Board

Figure 2: Installation – Verdin Development Board



2.4.2 Installation on the Dahlia Carrier Board

Figure 3: Installation – Dahlia Carrier Board



3 Interface Description

3.1 Toradex DSI Display Adapter Connector (X1)

Manufacturer: Samtec LSS-130-03-L-DV-A-K-TR

Type: High-Speed Socket

Table 3: X1 pin assignment

Pin	Signal name	I/O Type	Voltage	Pull-up/Pull-down	Description
1	NC				Not connected
3	GND	PWR			
5	NC				Not connected
7	NC				Not connected
9	NC				Not connected
11	NC				Not connected
13	NC				Not connected
15	NC				Not connected
17	NC				Not connected
19	+V5_SW	PWR	+5V		+5V power supply input
21	+V5_SW	PWR	+5V		+5V power supply input
23	+V5_SW	PWR	+5V		+5V power supply input
25	+V5_SW	PWR	+5V		+5V power supply input
27	+V5_SW	PWR	+5V		+5V power supply input
29	NC				Not connected
31	+V3.3_SW	PWR	+3.3V		+3.3V power supply input
33	+V3.3_SW	PWR	+3.3V		+3.3V power supply input
35	+V3.3_SW	PWR	+3.3V		+3.3V power supply input
37	+V3.3_SW	PWR	+3.3V		+3.3V power supply input
39	+V3.3_SW	PWR	+3.3V		+3.3V power supply input
41	NC				Not connected
43	+V1.8_SW	PWR	+1.8V		+1.8V power supply input
45	+V1.8_SW	PWR	+1.8V		+1.8V power supply input
47	+V1.8_SW	PWR	+1.8V		+1.8V power supply input
49	+V1.8_SW	PWR	+1.8V		+1.8V power supply input
51	+V1.8_SW	PWR	+1.8V		+1.8V power supply input
53	NC				Not connected
55	GND	PWR			
57	NC				Not connected
59	NC				Not connected
2	NC				Not connected
4	I2C_1_SDA	I/O	+1.8V	On carrier board	I2C interface for configuring LVDS display
6	I2C_1_SCL	I	+1.8V	On carrier board	I2C interface for configuring LVDS display

Continued on next page

Table 3: X1 pin assignment (Continued)

Pin	Signal name	I/O Type	Voltage	Pull-up/Pull-down	Description
8	GPIO_9_DSI	O	+1.8V	10k to IO_VREF	Interrupt signal
10	GND	PWR			
12	DSI_1_D0_P	I/O			DSI Interface data lane 0
14	DSI_1_D0_N	I/O			DSI Interface data lane 0
16	GND	PWR			
18	DSI_1_D1_P	I			DSI Interface data lane 1
20	DSI_1_D1_N	I			DSI Interface data lane 1
22	GND	PWR			
24	DSI_1_CLK_P	I			DSI Interface clock
26	DSI_1_CLK_N	I			DSI Interface clock
28	GND	PWR			
30	DSI_1_D2_P	I			DSI Interface data lane 2
32	DSI_1_D2_N	I			DSI Interface data lane 2
34	GND	PWR			
36	DSI_1_D3_P	I			DSI Interface data lane 3
38	DSI_1_D3_N	I			DSI Interface data lane 3
40	GND	PWR			
42	I2S_2_BCLK	I	+1.8V	10k to IO_VREF	Global reset to the display
44	NC				Not connected
46	NC				Not connected
48	NC				Not connected
50	GND	PWR			
52	I2C_2_DSI_SCL	I	+1.8V	On carrier board	I2C interface for configuring LVDS display
54	I2C_2_DSI_SDA	I/O	+1.8V	On carrier board	I2C interface for configuring LVDS display
56	GPIO_10_DSI	I	+1.8V	10k to GND	Power-down
58	PWM_3_DSI	I	+1.8V	10k to GND	Display brightness control input
60	GND	PWR			

3.2 MIPI DSI FFC/FPC Connector (X2)

Manufacturer: Würth Elektronik 687134149022
 Type: FFC/FPC Connector (bottom sided contacts)

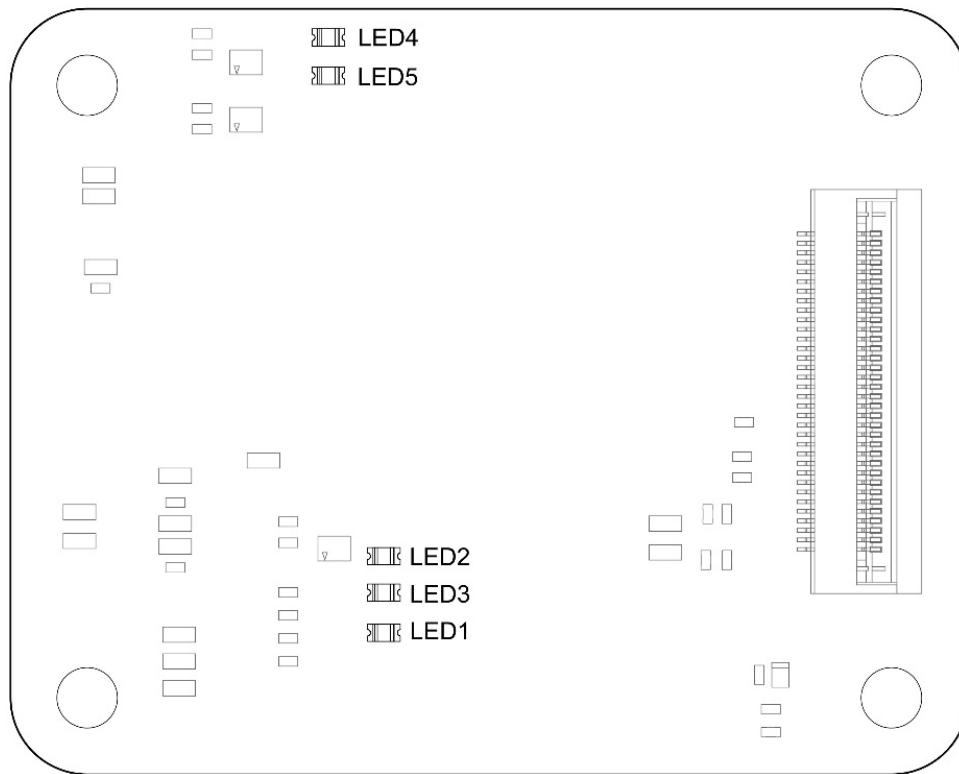
Table 4: X2 pin assignment

Pin	Signal name	I/O Type	Voltage	Pull-up/Pull-down	Description
1	GND	PWR			
2	DSI_1_D0_P	I/O			DSI Interface data lane 0
3	DSI_1_D0_N	I/O			DSI Interface data lane 0
4	GND	PWR			
5	DSI_1_D1_P	O			DSI Interface data lane 1
6	DSI_1_D1_N	O			DSI Interface data lane 1
7	GND	PWR			
8	DSI_1_CLK_P	O			DSI Interface clock
9	DSI_1_CLK_N	O			DSI Interface clock
10	GND	PWR			
11	DSI_1_D2_P	O			DSI Interface data lane 2
12	DSI_1_D2_N	O			DSI Interface data lane 2
13	GND	PWR			
14	DSI_1_D3_P	O			DSI Interface data lane 3
15	DSI_1_D3_N	O			DSI Interface data lane 3
16	GND	PWR			
17	PWR_DN#	O	IO_VREF	10k to GND	Display power down
18	PWM_3_DSI_CON	O	IO_VREF	10k to GND	Display brightness control output
19	INT_DSI#	I	IO_VREF	10k to IO_VREF	Interrupt signal output with an open drain
20	I2C_DSI_SCL	O	+1.8V	On carrier board	I2C interface for configuring LVDS display
21	I2C_DSI_SDA	I/O	+1.8V	On carrier board	I2C interface for configuring LVDS display
22	DSI_RESET_CON#	O	IO_VREF	10k to IO_VREF	Display reset
23	+V1.8_SW_DSI	PWR	+1.8V		Power output
24	IO_VREF	PWR	+1.8V		IO reference voltage output
25	+V3.3_SW_DSI	PWR	+3.3V		Power output
26	+V5_SW_DSI	PWR	+5V		Power output
27	+V5_SW_DSI	PWR	+5V		Power output
28	+V5_SW_DSI	PWR	+5V		Power output
29	+V5_SW_DSI	PWR	+5V		Power output
30	GND	PWR			
31	RESERVED				Reserved for future use
32	RESERVED				Reserved for future use
33	RESERVED				Reserved for future use
34	RESERVED				Reserved for future use

3.3 On-board LEDs

The Toradex DSI Display Adapter board features 5 LEDs. These LEDs show the status of the power supply and important control signals.

Figure 4: On-board LEDs



The LEDs and their functions are listed in [Table 5](#).

Table 5: LED Functions

Designator	Silkscreen name	Led-on description
LED1	+3.3V	+3.3V_SW_DSI rail is powered
LED2	+1.8V	+1.8V_SW_DSI rail is powered
LED3	+5V	+5V_SW_DSI (backlight) rail is powered
LED4	PWR_DN#	Display is in "Power Down" state
LED5	RESET#	Display is in "RESET" state

3.4 Power Supply

3.4.1 Pins

The adapter does not require external supplies as it is powered by the carrier board through the X1 connector by the pins listed in [Table 6](#). The complete X1 pinout is available on ?? on page ??.

Table 6: X1 adapter power supply pins

Signal	Pin	Description
GND	3, 10, 16, 22, 28, 34, 40, 50, 55, 60	Ground
+V1.8_SW	43, 45, 47, 49, 51	+1.8V power input
+V3.3_SW	31, 33, 35, 37, 39	+3.3V power input
+V5_SW	19, 21, 23, 25, 27	+5V power input

The display may be powered through the X2 connector by the pins listed in [Table 7](#). The complete X2 pinout is available on [Section 3.2](#) on page 9.

Table 7: X2 display power supply pins

Signal	Pin	Description
GND	1, 4, 7, 10, 13, 16, 30	Ground
+V1.8_SW	23	+1.8V power output
+V3.3_SW	25	+3.3V power output
+V5_SW	26, 27, 28, 29	+5V power output

Note: Each pin supports up to 500mA.

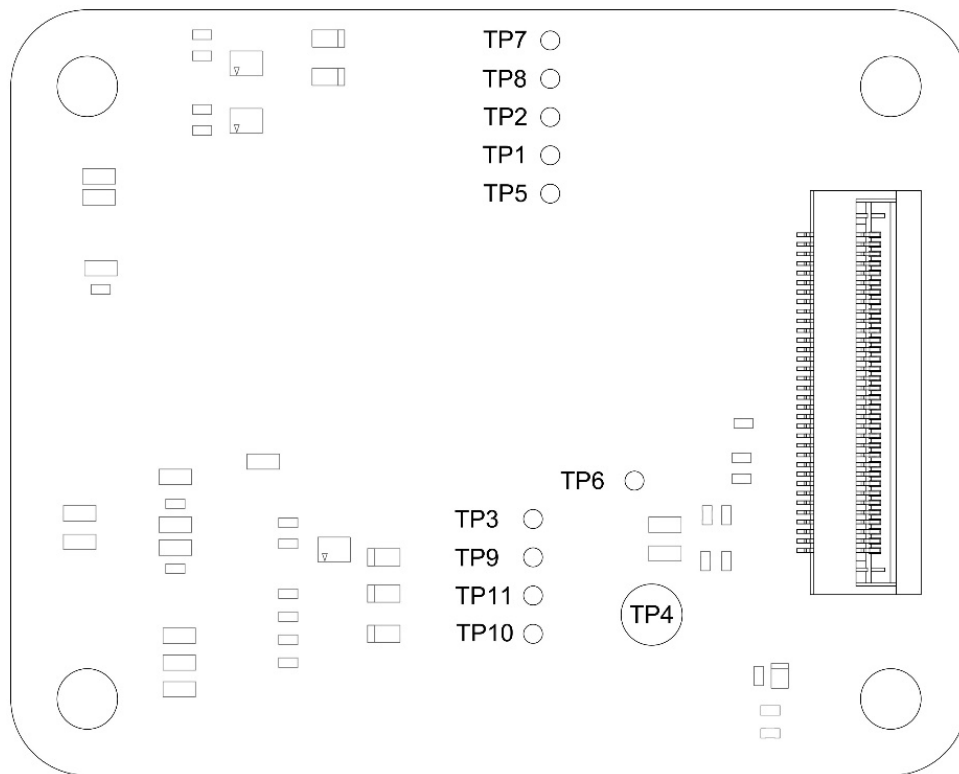
3.4.2 Backlight

The backlight driver should be integrated into the display assembly, as there is no backlight driver included in the adapter.

3.5 Test Points

The Toradex DSI Display Adapter board features 11 test points to provide access to important signals. [Figure 5](#) shows the physical locations of the test points.

Figure 5: Test points



The test points and their functions are listed in [Table 8](#).

Table 8: Test points signals

Designator	Signal
TP1	I2C_DSI_SCL
TP2	I2C_DSI_SDA
TP3	IO_VREF
TP4	GND
TP5	INT_DSI#
TP6	PWM_3_DSI_CON
TP7	PWR_DN#
TP8	DSI_RESET#
TP9	+V1.8_SW_DSI
TP10	+V3.3_SW_DSI
TP11	+V5_SW_DSI

4 Technical Specifications

4.1 Power Supply Characteristics

4.1.1 Supply Voltage

Table 9: Supply Voltage

Rail	Conditions	Min.	Typ.	Max.	Unit
+V1.8_SW		1.65	1.8	1.95	V
+V3.3_SW		3.0	3.3	3.5	V
+V5_SW		4.5	5.0	5.5	V
IO_VREF	R6 installed, R23 replaced by default	-	+V1.8_SW	-	-
IO_VREF	R23 installed, R6 replaced – optional	-	+V3.3_SW	-	-

4.1.2 Supply Current

The currents on the power rails are fully dependant on the attached display. The adapter itself consumes little power.

Table 10: Supply Current

Rail	Conditions	Max.	Unit
+V1.8_SW		0.5	A
+V3.3_SW		0.5	A
+V5_SW		2.0	A

4.2 Product Compliance

Up-to-date information about product compliance such as RoHS, CE, UL-94, Conflict Mineral, REACH, etc. can be found [on our website¹](https://www.toradex.com/support/product-compliance).

4.3 Thermal Specification

Table 11: Thermal specification

Description	Min.	Max.	Unit
Operating temperature range	-40	+85	°C
Storage temperature	-40	+85	°C

¹<https://www.toradex.com/support/product-compliance>

5 Mechanical Data

5.1 Physical Drawings

5.1.1 Adapter Dimensions

Figure 6: Dimensions in mm – top view

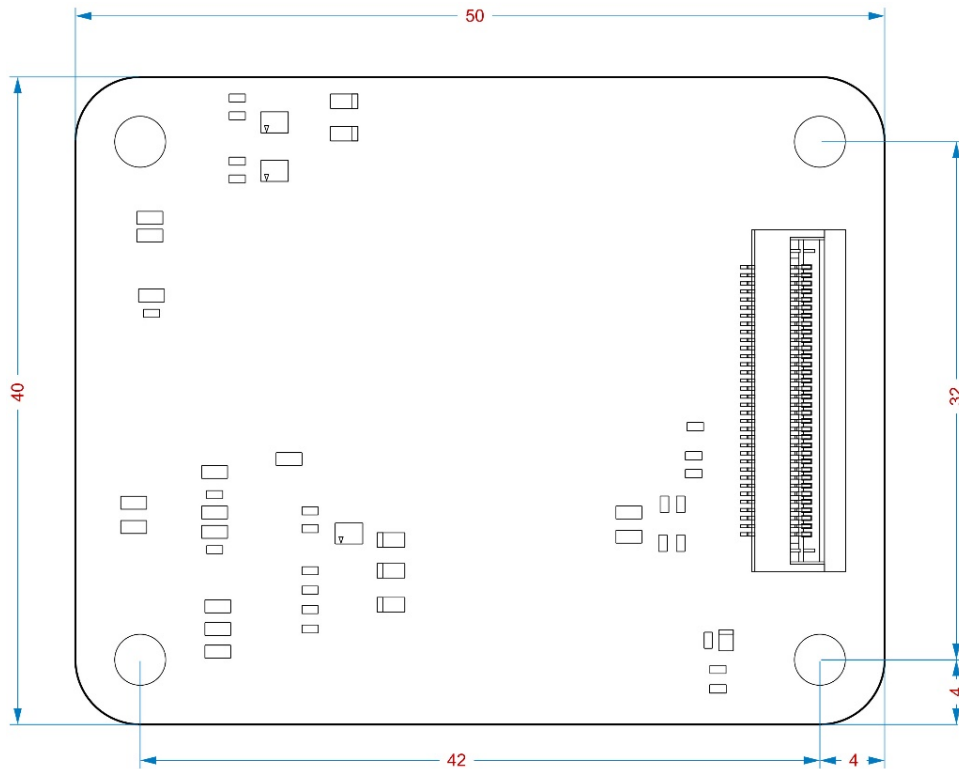


Figure 7: Dimensions in mm – side view

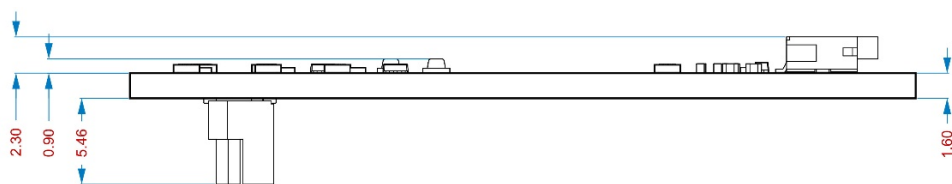
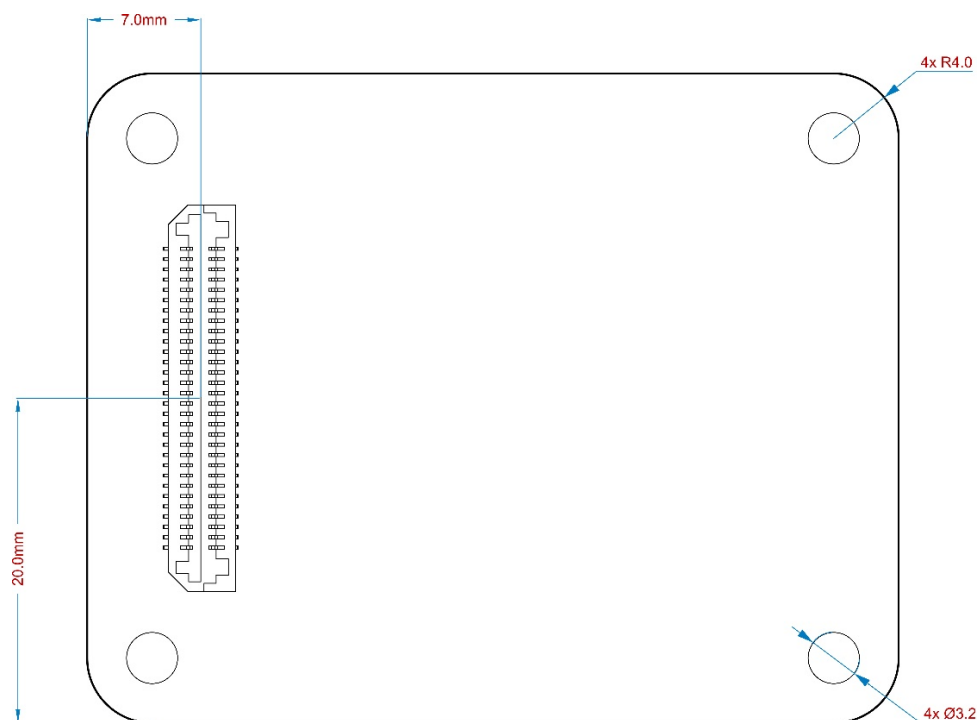


Figure 8: Dimensions in mm – bottom view



5.1.2 Connector Locations

Figure 9: Connectors – top

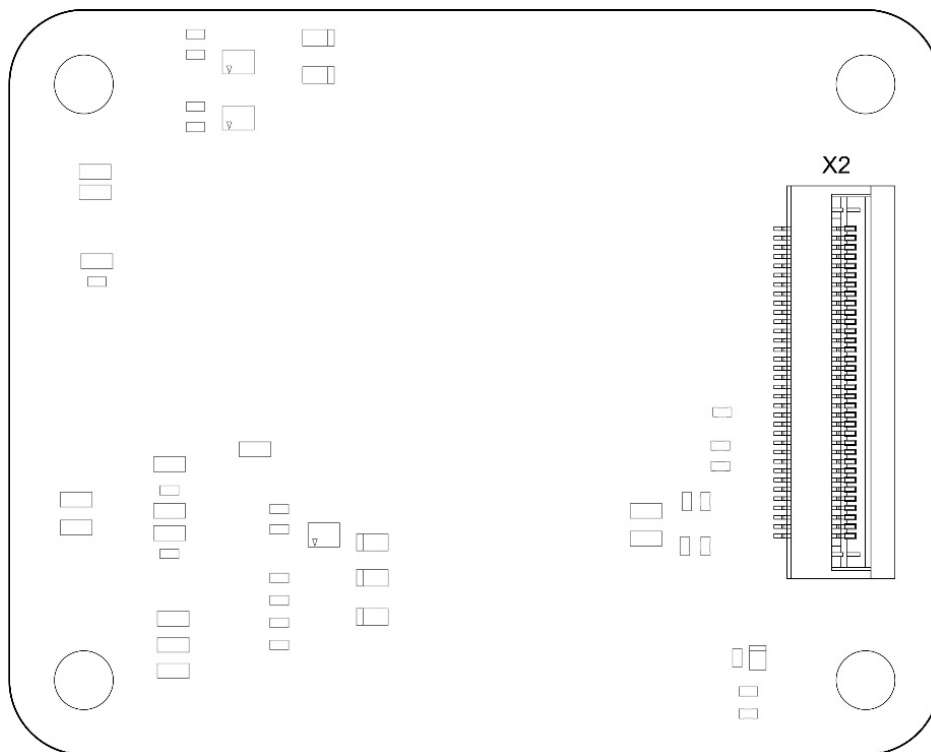
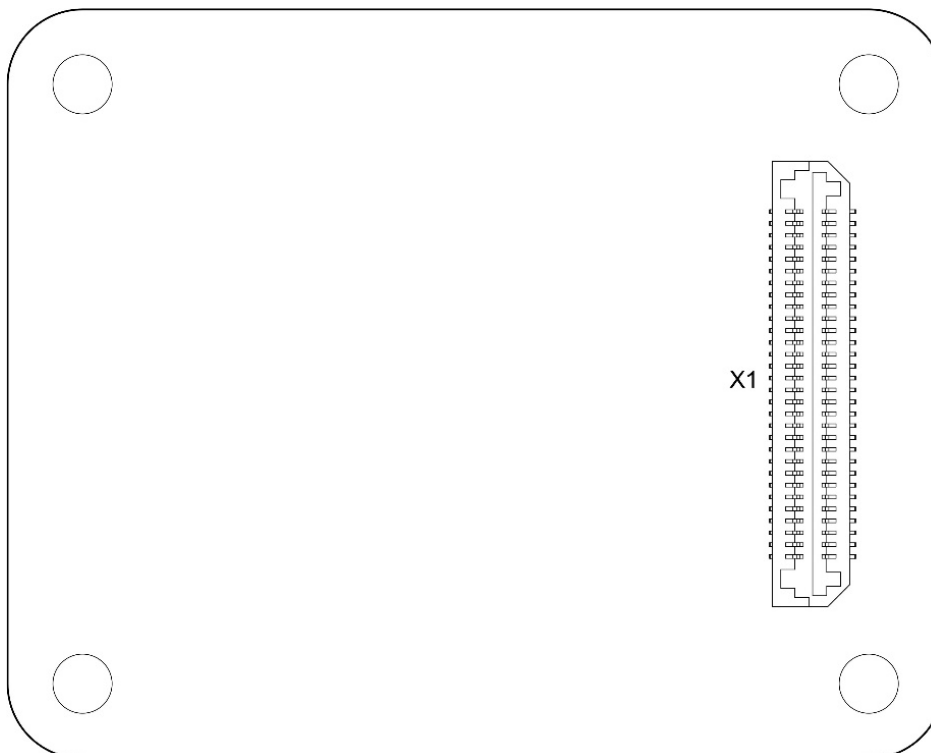


Figure 10: Connectors – bottom



6 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.

The board design data can be downloaded from [Toradex Developer Website](http://developer.toradex.com)²

²<http://developer.toradex.com/carrier-board-design/reference-designs>

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