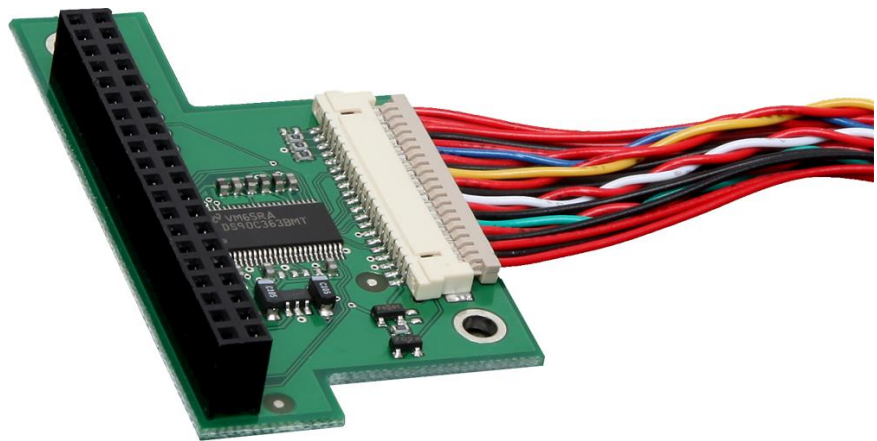


# LVDS Converter

## Datasheet



## Revision history

| Date         | Doc. Rev. | LVDS Converter Version | Changes                                                                                                       |
|--------------|-----------|------------------------|---------------------------------------------------------------------------------------------------------------|
| 15-Jan-2007  | Rev. 1.0  | V1.0                   | Initial Release                                                                                               |
| 16-July-2015 | Rev. 1.1  | V1.0                   | Section 4, Installation: added Fig 1 & 2 in the section.<br>Section 8, Product Compliance: added new section. |

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## 1. Introduction

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Attached to the Generic Display Connector found on various Toradex products (such as the Colibri Evaluation Board and the Orchid) the Toradex LCD-Converters family of products enables the attachment of Industry Standard Panels with a LVDS Interface.

Currently there are two member of this product line available:

- LVDS\_A1715\_V01\_00a: LVDS Converter 1.25mm pitch
- LVDS\_A1715\_V01\_00b: LVDS Converter 1.0mm pitch

Each of these Converters consists of an assembled PCB implementing the LVDS conversion as well as a corresponding LVDS cable used to interface to the LCD.

## 2. Reference Document

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For detailed technical information about the LVDS Converters please refer to the documents listed below:

- The various configuration of the digital RGB interface provided by the Colibri modules are described in detail in the datasheets of the corresponding processors.  
Note: Marvell requires a Non-Disclosure Agreement to be signed before customers get access to their documentation.
- The VESA SPWG 2.0 Specification (Standard Panel Working Group) defines standard mechanical and electrical characteristics for Industry Standard Panels:  
<http://www.vesa.org/Public/Panel%20Standards/StdPanel2.0.pdf>
- The definition of the electrical interface is described in:  
TIA/EIA-644 Electrical Characteristics Of Low Voltage Differential Signaling (LVDS) Interface

## 3. Functional Description

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The 18 bit RGB signals from the graphic controller are input to the LVDS Converter module. There the parallel RGB data is multiplexed and converted to a single channel LVDS (Low Voltage Differential Signaling) interface in order to be connected to the LCD.

On the Display itself the received data is then demultiplexed, converted back to TTL levels and sent to the inputs of the timing controller.

The use of the LVDS interface allows the data to travel at faster speeds across a narrow interface, addressing needs associated with high bandwidth communication.

### 3.1. Supported Display Characteristics

#### 3.1.1 LVDS\_A1715\_V01\_00a

- Maximum WXGA resolution: 1440 x 900 Pixels
- 18 bit color resolution (262'144 different colors)
- Single Channel LVDS Interface
- Connector: Hirose DF14-20P-1.25H or equivalent
- Compliant to Industry Standard Panel 2.0 Specification Style A, XGA with two exceptions: First of all a 1.25mm pitch connector deployed which is found on larger LCDs (15" and 17"). Second this LVDS Converter does also not support the Display Data Channel (DDC) on pins 17, 19 and 20 of the connector. Most Industry Panels do not feature the DDC function anyway.

#### 3.1.2 LVDS\_A1715\_V01\_00b

- Maximum WXGA resolution: 1'440 x 900 Pixels
- 18 bit color resolution (262'144 different colors)
- Single Channel LVDS Interface
- Connector: Hirose DF19G-20P-1H or equivalent
- Compliant to Industry Standard Panel 2.0 Specification Style A, XGA with the exception that the LVDS Converter does not support the Display Data Channel (DDC) on pins 17, 19 and 20 of the connector.

## 4. Installation

For the installation of the LVDS Converter on Colibri Evaluation Board or on Orchid be cautious to match the Pin 1 indicators of both connectors.

Following images describe represents, how to correctly install the LVDS converter on the Colibri Evaluation Board and Orchid Carrier Board.

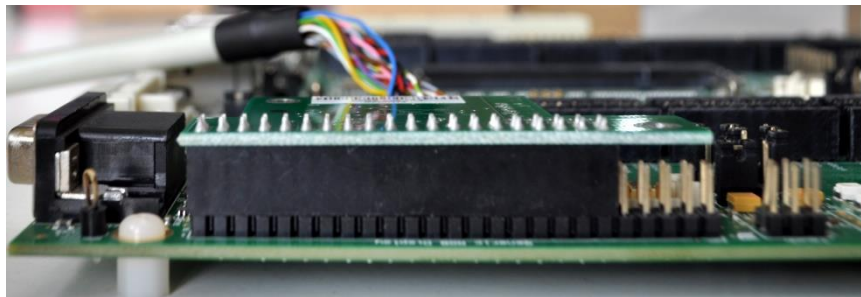
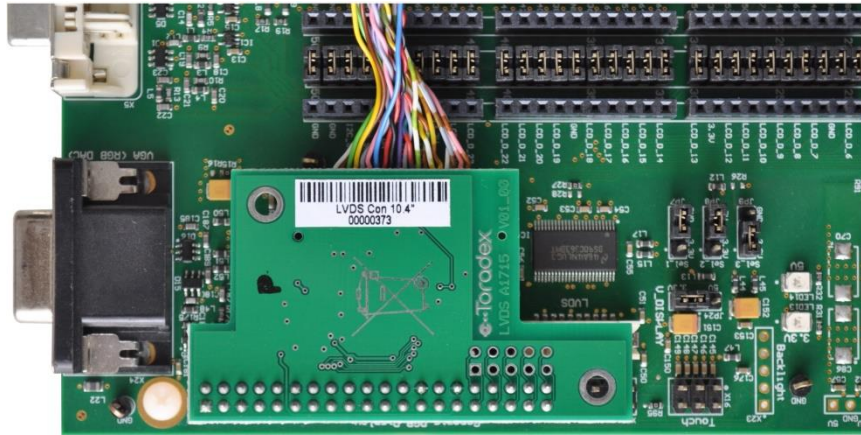


Fig.1 & 2 LVDS Converter installed on the Colibri Evaluation Board V3.1 / V3.2 – Top View and Side View

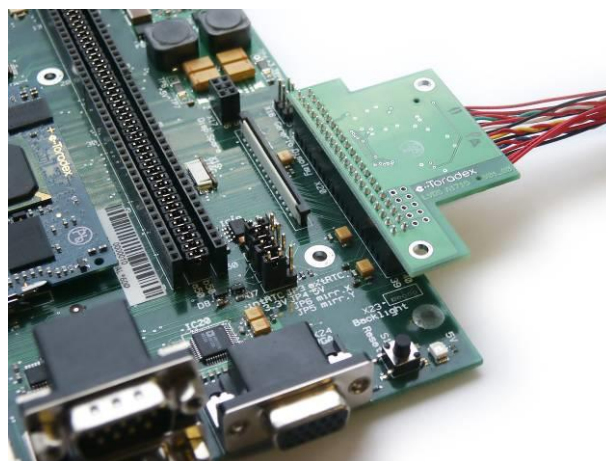


Fig. 3 LVDS Converter installed on the Colibri Evaluation Board V2.1



Fig. 4 LVDS Converter installed on Orchid

## 5. Physical Drawing

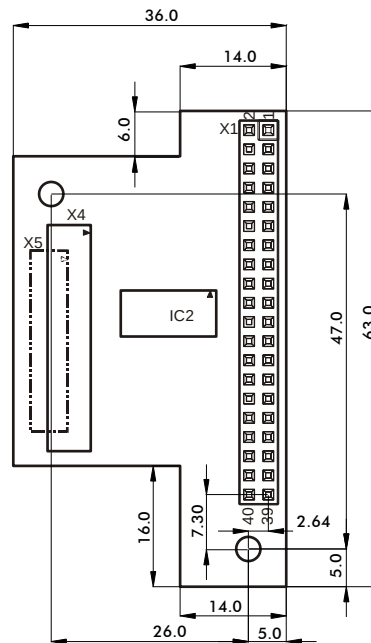


Fig. 4 Physical locations of the connectors

The following list details the connector and their functions:

| Reference Designator | Name of the connector |
|----------------------|-----------------------|
| X1                   | Generic Display RGB   |
| X2                   | Spare                 |
| X4                   | LVDS 1.25mm           |
| X5                   | LVDS 1.0mm            |

## 6. Connector Pinout

### 6.1. Generic Display RGB (X1)

Type: 2x10Pin Header Female, 2.54mm

Part number JVE P8562-40S10-01G

Pins 31 – 36 as well as pins 38 – 40 can be used defined and are routed to the Spare connector X2. These interconnections can be used to implement additional functions such as Left/Right, Up/Down, brightness or contrast control. They may also be used to hook up the power to the backlight inverter.

| Pin Nr. | Signal Name | IO Type | Voltage      | Pullup/Pulldown |
|---------|-------------|---------|--------------|-----------------|
| 1       | GND         | PWR     |              |                 |
| 2       | L_PCLK      | OI      | +3V3         |                 |
| 3       | L_LCLK      | O       | +3V3         |                 |
| 4       | L_FCLK      | O       | +3V3         |                 |
| 5       | GND         | PWR     | PWR          |                 |
| 6       | LDD[12]     | O       | +3V3         |                 |
| 7       | LDD[13]     | O       | +3V3         |                 |
| 8       | LDD[14]     | O       | +3V3         |                 |
| 9       | LDD[15]     | O       | +3V3         |                 |
| 10      | LDD[16]     | O       | +3V3         |                 |
| 11      | LDD[17]     | O       | +3V3         |                 |
| 12      | GND         | PWR     |              |                 |
| 13      | LDD[6]      | O       | +3V3         |                 |
| 14      | LDD[7]      | O       | +3V3         |                 |
| 15      | LDD[8]      | O       | +3V3         |                 |
| 16      | LDD[9]      | O       | +3V3         |                 |
| 17      | LDD[10]     | O       | +3V3         |                 |
| 18      | LDD[11]     | O       | +3V3         |                 |
| 19      | GND         | PWR     |              |                 |
| 20      | LDD[0]      | O       | +3V3         |                 |
| 21      | LDD[1]      | O       | +3V3         |                 |
| 22      | LDD[2]      | O       | +3V3         |                 |
| 23      | LDD[3]      | O       | +3V3         |                 |
| 24      | LDD[4]      | O       | +3V3         |                 |
| 25      | LDD[5]      | O       | +3V3         |                 |
| 26      | GND         | PWR     |              |                 |
| 27      | L_BIAS      | I       | +3V3         |                 |
| 28      | +V_DISPLAY  | PWR     | +3V3 or +5V  |                 |
| 29      | +V_DISPLAY  | PWR     | +3V3 or +5V  |                 |
| 30      | GND         | PWR     |              |                 |
| 31      | DISP_SPARE8 |         | User defined |                 |
| 32      | DISP_SPARE9 |         | User defined |                 |
| 33      | DISP_SPARE1 |         | User defined |                 |
| 34      | DISP_SPARE2 |         | User defined |                 |
| 35      | DISP_SPARE3 |         | User defined |                 |
| 36      | DISP_SPARE4 |         | User defined |                 |
| 37      | BL_ON       | O       | +3V3         |                 |
| 38      | DISP_SPARE5 |         | User defined |                 |
| 39      | DISP_SPARE6 |         | User defined |                 |
| 40      | DISP_SPARE7 |         | User defined |                 |

## 6.2. Spare (X2)

Type: 2x5Pin Header male, 2.54mm  
 Part number JVE-21B22564-10S10B-01G

These signals are user definable (with the exception of pin 7) and are simply routed trough from the generic Display RGB connector X1. The signals can be used to implement additional functions such as Left/Right, Up/Down, brightness or contrast control. They may also be used to hook up the power to the backlight inverter.

| Pin Nr. | Signal Name | IO Type | Voltage      | Pullup/Pulldown |
|---------|-------------|---------|--------------|-----------------|
| 1       | DISP_SPARE8 |         | User defined |                 |
| 2       | DISP_SPARE9 |         | User defined |                 |
| 3       | DISP_SPARE1 |         | User defined |                 |
| 4       | DISP_SPARE2 |         | User defined |                 |
| 5       | DISP_SPARE3 |         | User defined |                 |
| 6       | DISP_SPARE4 |         | User defined |                 |
| 7       | BL_ON       | O       | +3V3         |                 |
| 8       | DISP_SPARE5 |         | User defined |                 |
| 9       | DISP_SPARE6 |         | User defined |                 |
| 10      | DISP_SPARE7 |         | User defined |                 |

## 6.3. LVDS 1.25mm (X4)

Type: 20 Pin Header male, 1.25mm  
 Part number Hirose DF14-20P-1.25H

| Pin Nr. | Signal Name                                                     | IO Type | Voltage    |
|---------|-----------------------------------------------------------------|---------|------------|
| 1       | +V_LCD (switched by BL_ON)                                      | PWR     | +V_DISPLAY |
| 2       | +V_LCD (switched by BL_ON)                                      | PWR     | +V_DISPLAY |
| 3       | GND                                                             | PWR     |            |
| 4       | GND                                                             | PWR     |            |
| 5       | Rin0- Negative LVDS differential data (pixel R0-R5, G0)         | O       | LVDS       |
| 6       | Rin0+ Positive LVDS differential data (pixel R0-R5, G0)         | O       | LVDS       |
| 7       | GND                                                             | PWR     |            |
| 8       | Rin1- Negative LVDS differential data (pixel G1-G5, B0-B1)      | O       | LVDS       |
| 9       | Rin1+ Negative LVDS differential data (pixel G1-G5, B0-B1)      | O       | LVDS       |
| 10      | GND                                                             | PWR     |            |
| 11      | Rin2- Negative LVDS differential data (pixel B2-B5, HS, VS, DE) | O       | LVDS       |
| 12      | Rin2+ Negative LVDS differential data (pixel B2-B5, HS, VS, DE) | O       | LVDS       |
| 13      | GND                                                             | PWR     |            |
| 14      | CLK- Negative Clock Signal                                      | O       | LVDS       |
| 15      | CLK+ positive Clock Signal                                      | O       | LVDS       |
| 16      | GND                                                             | PWR     |            |
| 17      | GND                                                             | PWR     |            |
| 18      | GND                                                             | PWR     |            |
| 19      | GND                                                             | PWR     |            |
| 20      | GND                                                             | PWR     |            |

## 6.4. LVDS 1.0mm (X5)

Type: 20 Pin Header male, 1.0mm  
 Part number Hirose DF19G-20P-1H

| Pin Nr. | Signal Name                                             | IO Type | Voltage    |
|---------|---------------------------------------------------------|---------|------------|
| 1       | +V_LCD (switched by BL_ON)                              | PWR     | +V_DISPLAY |
| 2       | +V_LCD (switched by BL_ON)                              | PWR     | +V_DISPLAY |
| 3       | GND                                                     | PWR     |            |
| 4       | GND                                                     | PWR     |            |
| 5       | Rin0- Negative LVDS differential data (pixel R0-R5, G0) | O       | LVDS       |
| 6       | Rin0+ Positive LVDS differential data (pixel R0-R5, G0) | O       | LVDS       |
| 7       | GND                                                     | PWR     |            |

| Pin Nr. | Signal Name                                                     | IO Type | Voltage |
|---------|-----------------------------------------------------------------|---------|---------|
| 8       | Rin1- Negative LVDS differential data (pixel G1-G5, B0-B1)      | O       | LVDS    |
| 9       | Rin1+ Negative LVDS differential data (pixel G1-G5, B0-B1)      | O       | LVDS    |
| 10      | GND                                                             | PWR     |         |
| 11      | Rin2- Negative LVDS differential data (pixel B2-B5, HS, VS, DE) | O       | LVDS    |
| 12      | Rin2+ Negative LVDS differential data (pixel B2-B5, HS, VS, DE) | O       | LVDS    |
| 13      | GND                                                             | PWR     |         |
| 14      | CLK- Negative Clock Signal                                      | O       | LVDS    |
| 15      | CLK+ positive Clock Signal                                      | O       | LVDS    |
| 16      | GND                                                             | PWR     |         |
| 17      | GND                                                             | PWR     |         |
| 18      | GND                                                             | PWR     |         |
| 19      | GND                                                             | PWR     |         |
| 20      | GND                                                             | PWR     |         |

## 7. LVDS Cable

The cable provided along with the LVDS Converter has a length of 40 cm. For easy installation the cables have the same connector on either side:

### 7.1. LVDS\_A1715\_400a

Type: 20Pin Header female, 1.25mm  
 Part number Hirose DF14-20S-1.25C

### 7.2. LVDS\_A1715\_400b

Type: 20Pin Header female, 1.0mm  
 Part number Hirose DF19-20S-1C

## 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>

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