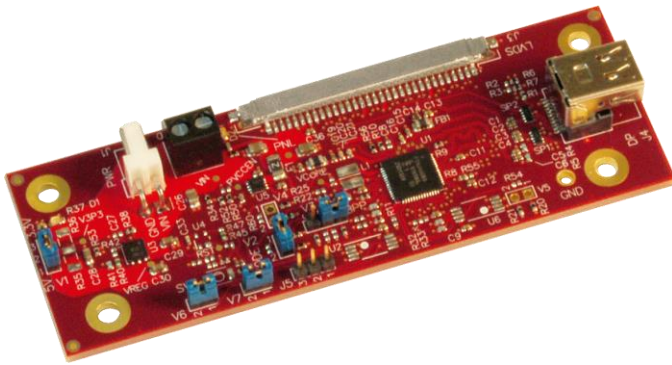


Reference Manual

DOC. REV. 1.1 AUG 2016

VL-EPH-V6

Mini DisplayPort to LVDS
Adapter





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Release Notes

Revision	Comments
Rev 1.0	Initial release of document
Rev 1.1	Corrected 1280x800 screen resolution nomenclature in Table 6 and Table 7; replaced the term “SXGA” with “WXGA”.

Customer Support

If you are unable to solve a problem after reading this manual or searching the KnowledgeBase, contact VersaLogic Technical Support at (503) 747-2261. VersaLogic support engineers are also available via e-mail at Support@VersaLogic.com.

Repair Service

If your product requires service, you must obtain a Returned Material Authorization (RMA) number by calling 503-747-2261. Please provide the following information:

- Your name, the name of your company, your phone number, and e-mail address
- The name of a technician or engineer that can be contacted if any questions arise
- The quantity of items being returned
- The model and serial number (barcode) of each item
- A detailed description of the problem
- Steps you have taken to resolve or recreate the problem
- The return shipping address

Warranty Repair All parts and labor charges are covered, including return shipping charges for UPS Ground delivery to United States addresses.

Non-warranty Repair All approved non-warranty repairs are subject to diagnosis and labor charges, parts charges and return shipping fees. Specify the shipping method you prefer and provide a purchase order number for invoicing the repair.

Note: Mark the RMA number clearly on the outside of the box before returning.

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Description

The VL-EPH-V6 module provides a rugged converter from standard mini-DisplayPort video output to LVDS (Low Voltage Differential Signaling) display panel output. The VL-EPH-V6 enables system designers to utilize their existing LVDS video panels with the latest embedded computer video output (mini-DisplayPort).

As with all VersaLogic products, the VL-EPH-V6 supports OEM applications where high reliability and long-term availability are required. From application design-in support, to the 5+ year production life guarantee, and a full 5-year warranty, the VL-EPH-V6 provides reliable video conversion for demanding applications.

The VL-EPH-V6 is compliant with both DisplayPort v1.2 and DisplayPort v1.1.

Technical Specifications

See the [VL-EPH-V6 Data Sheet](#) for complete specifications.

Block Diagram

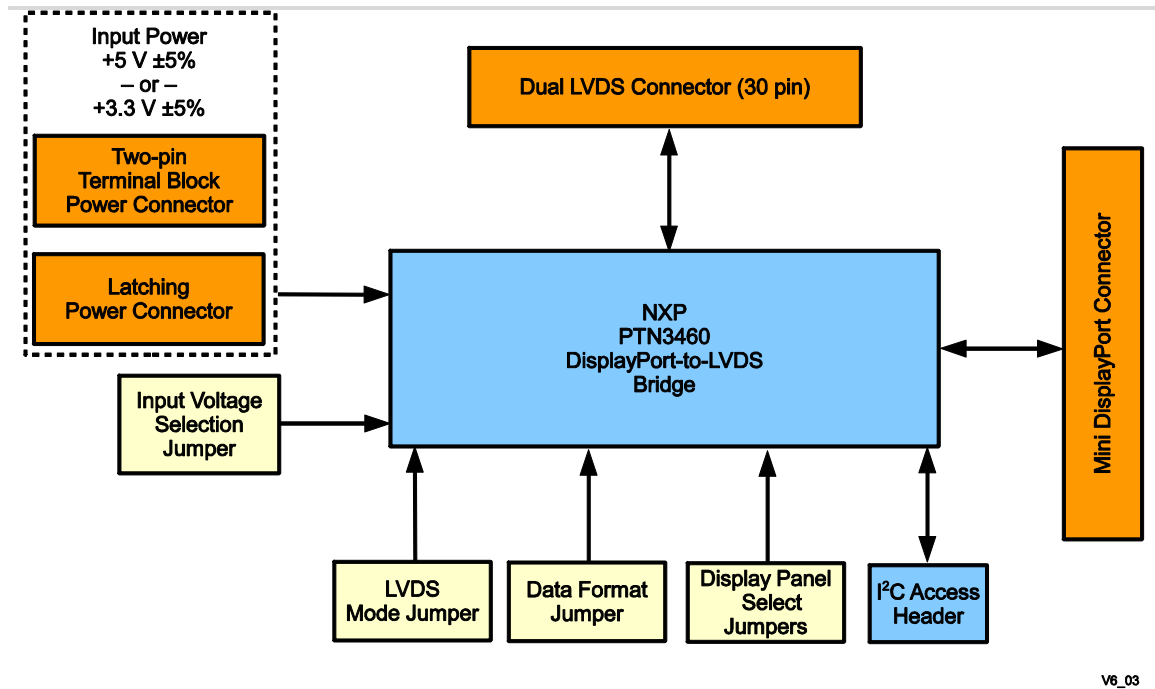


Figure 1. VL-EPH-V6 Block Diagram

Cautions

ELECTROSTATIC DISCHARGE

**CAUTION:**

Electrostatic discharge (ESD) can damage circuit boards, disk drives, and other components. The circuit board must only be handled at an ESD workstation. If an approved station is not available, some measure of protection can be provided by wearing a grounded antistatic wrist strap. Keep all plastic away from the board, and do not slide the board over any surface.

After removing the board from its protective wrapper, place the board on a grounded, static-free surface, component side up. Use an antistatic foam pad if available.

The board should also be protected inside a closed metallic antistatic envelope during shipment or storage.

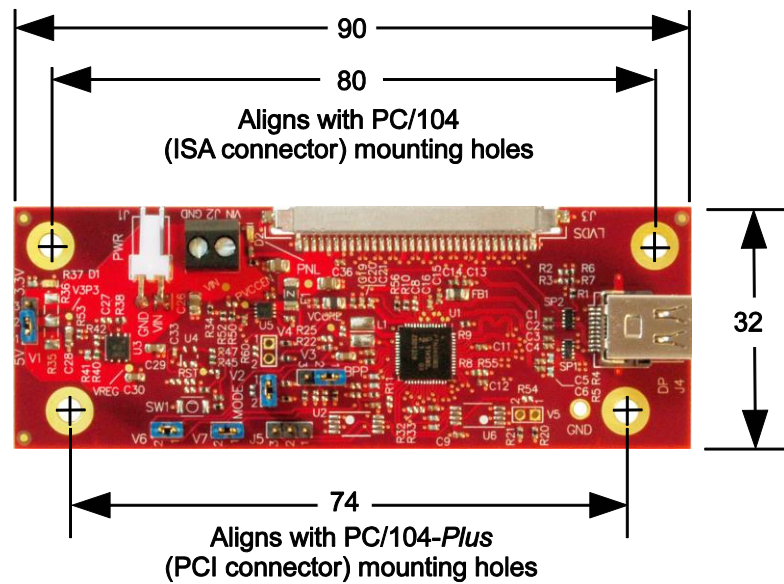
EARTH GROUND REQUIREMENT

**CAUTION:**

All mounting standoffs should be connected to earth ground (chassis ground). This provides proper grounding for EMI purposes.

Dimensions and Mounting

Figure 2 shows the dimensions of the VL-EPH-V6.



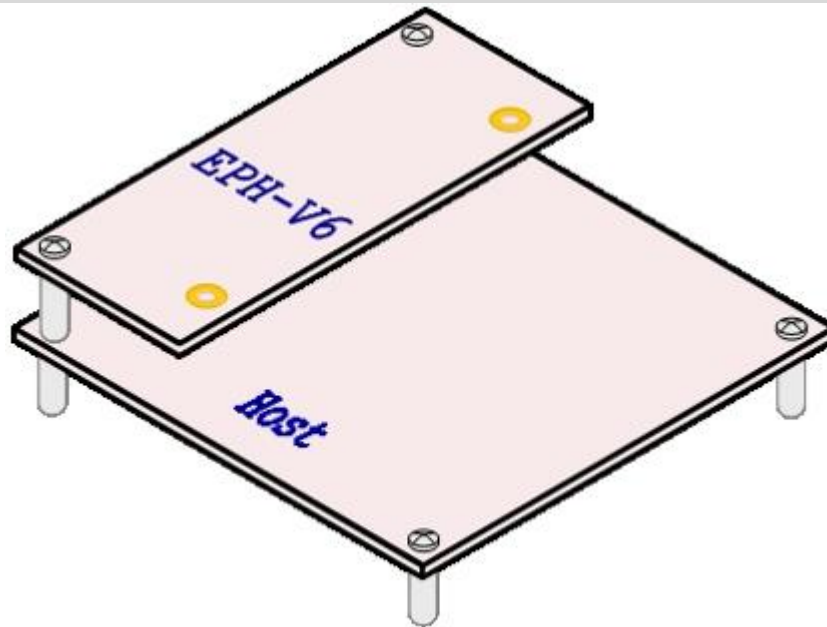
V6_01

Figure 2. VL-EPH-V6 Dimensions and Mounting Holes

(Not to scale. All dimensions in millimeters.)

Hardware Assembly

The VL-EPH-V6 can be secured to the host board using two hardware standoffs on the corner mounting holes. These standoffs attach to the host using pan head screws. Standoffs and screws are available as part number VL-HDW-105 (metric thread) or VL-HDW-106 (English thread). Figure 3 shows a typical installation.

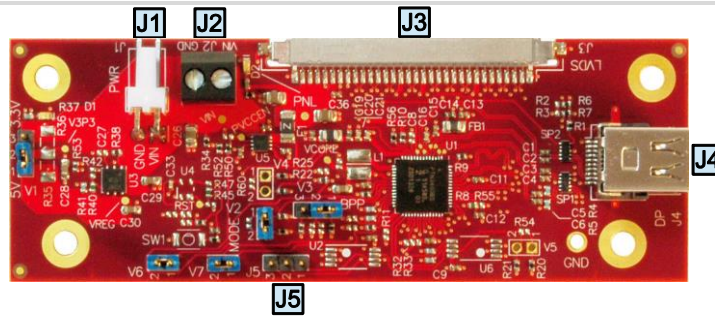


V6_04

Figure 3. VL-EPH-V6 Hardware Assembly

Interfaces and Connectors

Connector Locations



V6_02

Reference Designator	Description
J1	Power input connector
J2	Power input connector
J3	Dual-channel LVDS connector
J4	Mini DisplayPort connector
J5	Reserved

Figure 4. Connector Locations

Connector Functions and Interface Cables

Table 1 provides information about the function, mating connectors, and transition cables for VL-EPH-V6 connectors.

Table 1: Connector Functions and Interface Cables

Connector	Function	Mating Connector	Transition Cable	Cable Description
J1	Power input (Note 1)	Molex 22-05-3021 housing, Molex 2759 x2 crimp	—	Customer designed
J2	Power input (Note 2)	Insulated wire, 16 AWG	—	2-pin screw terminal
J3	LVDS	JAE FI-X30HL-B	VL-CBR-3001 VL-CBR-3002 VL-CBR-3003	Refer to Table 8 on page 13 for more information on these transition cables.
J4	Mini DisplayPort	Mini DisplayPort	VL-CBR-2031	36" Mini DisplayPort to Mini DisplayPort
J5	Reserved	—	—	—

Notes:

1. Use 22 AWG wire for this connector
2. Use 16 AWG wire for this connector. This is particularly necessary if you are using a +3.3 V power source.

Power Input Connectors

Connector J1 or J2 supplies input voltage to the VL-EPH-V6. Voltage is applied through one connector only, not both. The VL-EPH-V6 accepts power input of either $+5V \pm 5\%$ or $+3.3V \pm 5\%$. Jumper block V1 selects the input voltage (see Jumpers on page 10).



CAUTION:

A +5V input voltage must not be applied to the VL-EPH-V6 when 3.3V mode is selected. Doing so will damage the board.

- Connector J1 is a 2-pin header for use with a plug-in latching connector. This connector is useful for lower current LVDS panels (in the 1-3 A range).
- Connector J2 is a 2-pin screw terminal, useful for higher current panels (in the 3-4 A range).

Table 2 lists the pinout of the J1 and J2 connectors and shows the location of pin 1 for both connectors.

Table 2: J1 and J2 Power Input Connector Pinout

Pin	Signal	Description
1	V_IN	Power input
2	GND	Ground

V6_05

LVDS Interface

The VL-EPH-V6 provides a 30-pin, 1 mm pitch, dual-channel LVDS connector at location J3. Table 3 lists the pinout of the LVDS connector. Table 6 (on page 12) lists the LVDS cables available from VersaLogic.

Table 3: LVDS Connector Pinout

J3 Pin	Signal Name	Description
1	LVDS_ODD0_N	LVDS Odd Lane 0 Negative Differential Signal
2	LVDS_ODD0_P	LVDS Odd Lane 0 Positive Differential Signal
3	LVDS_ODD1_N	LVDS Odd Lane 1 Negative Differential Signal
4	LVDS_ODD1_P	LVDS Odd Lane 1 Positive Differential Signal
5	LVDS_ODD2_N	LVDS Odd Lane 2 Negative Differential Signal
6	LVDS_ODD2_P	LVDS Odd Lane 2 Positive Differential Signal
7	GND1	Signal/Power Ground
8	LVDS_ODDCLK_N	LVDS Odd Clock Negative Differential Signal
9	LVDS_ODDCLK_P	LVDS Odd Clock Positive Differential Signal
10	LVDS_ODD3_N	LVDS Odd Lane 3 Negative Differential Signal
11	LVDS_ODD3_P	LVDS Odd Lane 3 Positive Differential Signal
12	LVDS_EVEN0_N	LVDS Even Lane 0 Negative Differential Signal
13	LVDS_EVEN0_P	LVDS Even Lane 0 Positive Differential Signal
14	GND2	Signal/Power Ground
15	LVDS_EVEN1_N	LVDS Even Lane 1 Negative Differential Signal
16	LVDS_EVEN1_P	LVDS Even Lane 1 Positive Differential Signal
17	GND3	Signal/Power Ground
18	LVDS_EVEN2_N	LVDS Even Lane 2 Negative Differential Signal
19	LVDS_EVEN2_P	LVDS Even Lane 2 Positive Differential Signal
20	LVDS_EVENCLK_N	LVDS Even Clock Negative Differential Signal
21	LVDS_EVENCLK_P	LVDS Even Clock Positive Differential Signal
22	LVDS_EVEN3_N	LVDS Even Lane 3 Negative Differential Signal
23	LVDS_EVEN3_P	LVDS Even Lane 3 Positive Differential Signal
24	GND4	Signal/Power Ground
25	GND5	Signal/Power Ground
26	VCC1	Panel Power (5V or 3.3V)
27	GND6	Signal/Power Ground
28	VCC2	Panel Power (5V or 3.3V)
29	VCC3	Panel Power (5V or 3.3V)
30	VCC4	Panel Power (5V or 3.3V)

Mini DisplayPort Interface

The VL-EPH-V6 uses a Mini DisplayPort “Sink” interface at J4 to interface with the host computer Mini DisplayPort “Source” connector. VersaLogic cable VL-CBR-2031 provides the Mini DisplayPort to Mini Display port connection.

DisplayPort consists of the following interfaces:

- Main Link – transfers high speed isochronous video and audio data.
- Auxiliary channel – used for link management and device control. The Extended Display Identification Data (EDID) is read over this interface.
- Hot Plug Detect – this signal alerts the PCH when a device is connected.

The VL-EPH-V6 supports Main DP Link operation with one or two lanes. Table 4 lists the pinout of the VL-EPH-V6 Mini DisplayPort connector.

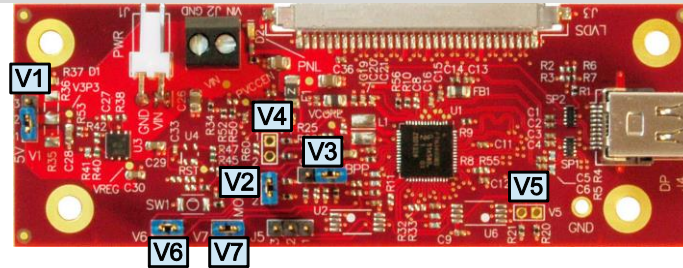
Table 4: J4 Mini DisplayPort Connector Pinout

Pin	Signal Name	Pin	Signal Name
1	GND	2	HOT PLUG DETECT
3	No connect	4	CONFIG 1 (Note)
5	No connect	6	CONFIG 2 (Note)
7	GND	8	GND
9	No connect	10	ML_LANE0_P
11	No connect	12	ML_LANE0_N
13	GND	14	GND
15	ML_LANE1_P	16	AUX_CH_P
17	ML_LANE1_N	18	AUX_CH_N
19	GND	20	No connect

Note: This signal is tied to ground through a 10 k Ω pull-down resistor.

Jumpers

Figure 5 shows the locations of the jumper blocks. Table 5 lists the functions and configurations of the jumper blocks.



V6_03

Reference Designator	Description
V1	Input voltage selection jumper
V2	LVDS mode jumper
V3	Data format and color depth jumper
V4	Reserved
V5	Reserved
V6	Panel type select jumper
V7	Panel type select jumper

Figure 5. Jumper Locations

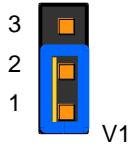
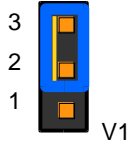
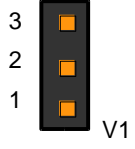
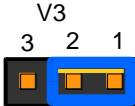
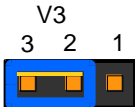



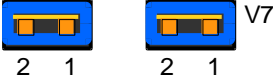





Integrator's Note:

- Set the input voltage selection jumper (V1) first.
- Set the panel configuration jumpers (V2, V3, V6, and V7) before connecting a display panel to the EPH-V6.

If any of the panel configuration jumpers are not properly set for the display device, no image will appear.

Table 5: Jumper Configurations

Function	Jumper Position	Configuration
Input voltage selection (Jumper V1)		Input voltage is +5V ±5% Engages circuitry that protects components that require +3.3V. (This is the as-shipped configuration)
		Input voltage is +3.3V ±5% CAUTION: A +5V input voltage must not be applied to the VL-EPH-V6 when 3.3V mode is selected. Doing so will damage the board.
		Logic circuits are not powered
Data format and color depth selection (Jumper V3)		<ul style="list-style-type: none"> JEIDA or VESA data format Color depth = 18 bits per pixel (bpp) (This is the as-shipped configuration)
		<ul style="list-style-type: none"> VESA data format Color depth = 24 bpp
		<ul style="list-style-type: none"> JEIDA data format Color depth = 24 bpp
LVDS mode (Jumper V2)		Single-channel LVDS (This is the as-shipped configuration)
		Dual-channel LVDS
Panel Type select (Jumpers V6 and V7)		These jumpers configure the EPH-V6 for use with one of four specific types of LVDS panel displays. For information on the supported display panel types, refer to Table 6 on page 12.
		
		
		









Display Panels and Cables



Configuring the Board for an LVDS Panel

The panel type select jumpers (V6 and V7) configure the EPH-V6 for the display device. When choosing a display device, match the characteristics of your selection to the data in the first column of Table 6. Set the panel type selection jumpers (V6 and V7) to match your display device's characteristics.

Table 6: LVDS Panel Types and Jumper Configurations

Supported Panel Characteristics	LVDS Signal Cable	Backlight Power Cable	V6/V7 Jumper Settings
<ul style="list-style-type: none"> Single channel 18/24 bit 800 x 600 (SVGA) 	VL-CBR-3003	VL-CBR-0601	V6  V7  2 1 2 1
<ul style="list-style-type: none"> Single channel 18/24 bit 1024 x 768 (XGA) 	VL-CBR-3002	VL-CBR-0601	V6  V7  2 1 2 1
<ul style="list-style-type: none"> Single channel 18/24 bit 1280 x 800 (WXGA) 	VL-CBR-3002	VL-CBR-0601	V6  V7  2 1 2 1
<ul style="list-style-type: none"> Dual channel 16.7M colors 1920 x 1080 (HD 1080) 	VL-CBR-3001	—	V6  V7  2 1 2 1



Integrator's Note:

Configure the V6 and V7 jumpers before connecting a display panel to the EPH-V6. If any of the configuration jumpers are not properly set for the display device, no image will appear.

LVDS Panel Displays Tested with the EPH-V6

Table 7 lists the LVDS panel displays tested with the EPH-V6.

Table 7: LVDS Panel Displays Tested with the EPH-V6

Manufacturer	Model Number	Display Resolution	Display Size	LVDS Signal Cable
Sharp	LQ121S1LG42	800x600 SVGA	12.1 inches (31 cm)	VL-CBR-3003
Sharp	LQ150X1LG91	1024x768 XGA	15 inches (38 cm)	VL-CBR-3002
Sharp	LQ121K1LG52LCD	1280x800 (WXGA)	12.1 inches (31 cm)	VL-CBR-3002
LG	LM230WF3-SLD1	1920x1080 (HD 1080)	23 inches (58.4 cm)	VL-CBR-3001

LVDS Cables Available from VersaLogic

Table 8: LVDS Cables Available from VersaLogic

VersaLogic Part Number	Length	Channels	Function
VL-CBR-3001	20 inches	2	30-pin JAE to 30-pin JAE
VL-CBR-3002	20 inches	1	30-pin JAE to 20-pin Hirose
VL-CBR-3003	20 inches	1	30-pin JAE to 20-pin JAE