



Reference Manual

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VL-MPEe-V5

Mini PCIe Video Adapter





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Product Release Notes

Rev 1.1 – Second release. Replaced VGA connector with a PicoClasp connector for enhanced reliability.

Rev 1.0 – Commercial Release.

Support Page

The [VL-MPEe-V5 Support Page](#) contains additional information and resources for this product including:

- Operating system information and links to software drivers
- Data sheets and manufacturers' links for chips used in this product
- Links to KnowledgeBase articles and product advisories

Knowledgebase

The [VersaTech KnowledgeBase](#) is a useful resource for resolving technical issues with your VersaLogic product.

Customer Support

If you are unable to solve a problem after reading this manual, visiting the product support page, 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. 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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Introduction

Description

The VL-MPEe-V5 is an extremely small and rugged video module based on the industry-standard Mini PCIe module format. It provides an easy and economical way to add VGA and LVDS display outputs to an embedded computing solution. The board's features include the following:

- One VGA and one LVDS port
- Rugged, latching connectors
- Industrial temperature operation
- RoHS-compliant
- Customization available

The module features high-reliability design and construction. Careful part sourcing and US-based technical support ensure the highest possible quality, reliability, service, and product longevity for this exceptional module.

This I/O board is compatible with a variety of popular x86 operating systems including Windows, Windows Embedded, and Linux.

Technical Specifications

Board Size:

30.00 mm x 50.95 mm (Mini PCIe standard)

Storage Temperature:

-40° to +85 °C

Operating Temperature:

-40° to +8 5°C, derate -1.1 °C per 305m (1,000 ft.) above 2,300m (7,500 ft.)

Power Requirements: *at +25°C running Windows 7*

3.3 V @ 1.67 W (supplied from the Mini PCIe socket, not including LVDS 3.3V panel power supply)

Video Controller:

Silicon Motion SM750. 2D Graphic Accelerator
Video core with 128-bit 2D graphic engine;
supports a single display, two cloned displays,
or two simultaneous independent displays

Video Output:

VGA: Up to 1920x1080 16-bit, 1440x960 32-bit

LVDS: Up to 1280x1024 18/24-bit
(see Table 2 for combined maximum resolutions)

VRAM:

16 MB DDR SDRAM (32-bit) embedded in SM750 controller

Mini PCIe Signal Type:

PCIe 1.1 signals from PCIe MiniCard bus
(USB and SMBus not used)

See the [VL-MPEe-V5 Data Sheet](#) for complete specifications.

Block Diagram

Figure 1 shows a block diagram of the MPEe-V5 video module.

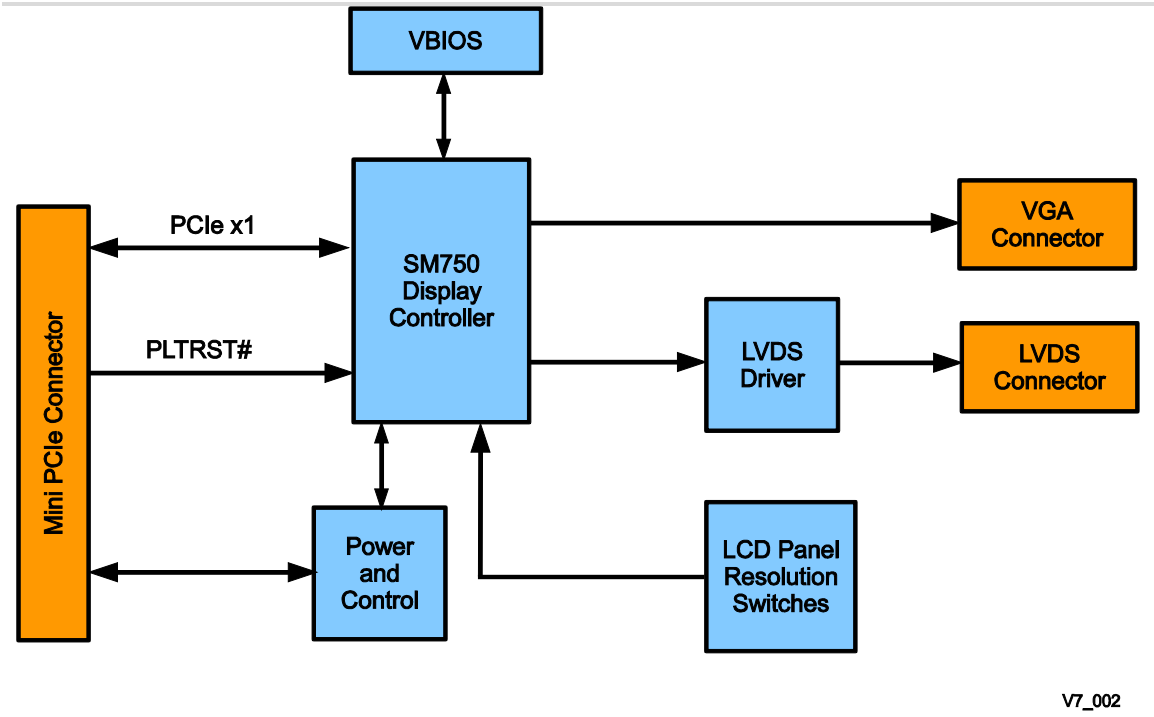


Figure 1. Video Module Block Diagram

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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 anti-static envelope during shipment or storage.

HANDLING CARE



CAUTION:

Care must be taken when handling the board not to touch the exposed circuitry with your fingers.

EARTH GROUND REQUIREMENT



CAUTION:

All mounting holes should be connected to earth ground (chassis ground). This provides proper grounding for ESD and EMI purposes. In portable applications, the mounting holes should be connected to the ground reference of the system power supply.

Physical Layout

Dimensions and Mounting

VL-MPEE-V5 MOUNTING

The VL-MPEE-V5 is a full size Mini PCIe card and needs to be mounted into a full size Mini PCIe site. On VersaLogic CPU boards, the module is secured using two nylon screws. VersaLogic supplies 2 mm nylon screws (VL-HDW-110) and 2.5 mm nylon screws (VL-HDW-108). On non-VersaLogic CPU boards, mounting might be accomplished using a latching system.

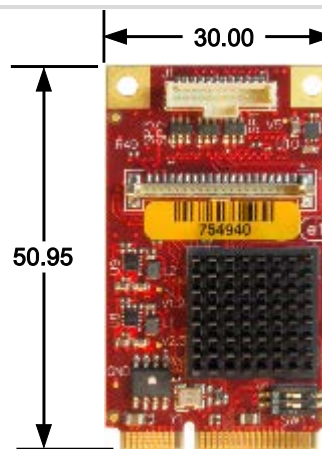


Note:

Be careful not to over tighten the nylon mounting screws. Optimum tightness is 1 lbf-in (0.1 N-m).

VL-MPEE-V5 DIMENSIONS AND CONNECTORS

The VL-MPEE-V5 complies with MiniPCIe Mini Card (full size) dimensional standards. Dimensions are given below to help with pre-production planning and layout. Figure 2 provides dimensions to help with pre-production planning and layout.



V7_011

Figure 2. Video Module Dimensions and Connectors

(Not to scale. All dimensions in millimeters.)

CONNECTOR FUNCTIONS AND INTERFACE CABLES

Table 1 provides information about the function, mating connectors, and transition cables for VL-MPEe-V5 board connectors.

Table 1: Connector Functions and Interface Cables

Connector	Function	Mating Connector	Transition Cable	Cable Description	Reference
J1	VGA	Molex 501330-0500 pin/crimp	VL-CBR-1204	12-inch VGA interface cable, 12-pin PicoClasp cable to 15-pin VGA	Page 6
J2	LVDS	Hirose DF19G-20S-1C (housing), Hirose DF19-2830SCFA x19 (crimp socket)	VL-CBR-2015 (Note 1) --or-- VL-CBR-2016 (Note 2)	20-inch 18- or 24-bit LVDS cable	Page 7

Notes:

1. Attaches to optional VL-CBR-2014, LVDS to VGA adapter.
2. The CBR-2015 works with the LVDS to VGA adapter; the CBR-2016 does not.

Interfaces and Connectors

Video

The Silicon Motion SM750 graphics controller has integrated high-performance 2D video, analog and flat panel output capability, and 16 MB of embedded VRAM.

The controller supports a single display, two cloned displays, or two simultaneous independent displays. Table 2 lists the maximum resolutions for each video channel depending on the setup.

Table 2: Maximum Display Resolutions

Bits Per Pixel	Channels	Maximum CRT Resolution	Maximum LCD Resolution
16 bpp	Single	1920 x 1080	1280 x 1024
	Cloned	1280 x 1024	1280 x 1024
	Dual	1280 x 1024	1280 x 1024
32 bpp	Single	1440 x 960	1280 x 1024
	Cloned	1280 x 1024	1280 x 1024
	Dual	1280 x 720	800 x 600

VGA INTERFACE

The VGA interface is a standard analog output with a 12-pin PicoClasp connector. An optional cable, part number VL-CBR-1204, is available to translate VGA connector J1 into a standard 15-pin D-Sub SVGA connector.

Table 3 lists the function of each pin.

Table 3: J1 VGA Connector Pinout

J1 Pin	Signal Name	Function	DB15 Pin
1	GND	Ground	6
2	VGA_RED	Red Video	1
3	GND	Ground	7
4	VGA_GREEN	Green Video	2
5	GND	Ground	8
6	VGA_BLUE	Blue Video	3
7	GND	Ground	5
8	VGA_HSYNC	Horizontal Sync	13
9	GND	Ground	10
10	VGA_VSYNC	Vertical Sync	14
11	CLK_VGA_DDC	DDC Serial Data Line Clock	15
12	VGA_DDC_DATA	DDC Serial Data Line	12

LVDS FLAT PANEL DISPLAY CONNECTOR

The LVDS connector at location J2 is a 20-pin vertical Hirose-style connector.

The flat panel interface can support 18 or 24 bits of RGB pixel data plus three bits of timing control (HSYNC/VSYNC/DE) on the four differential data output pairs. The LVDS interface supports a maximum resolution of 1280 x 1024.

Table 4: LVDS Flat Panel Display Pinout

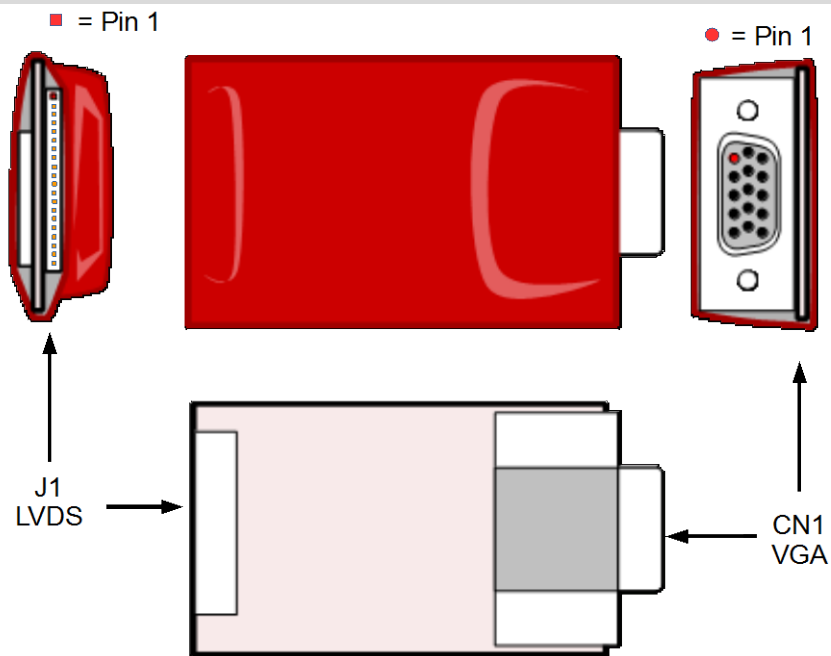
J2 Pin	Signal Name	Function
1	GND	Ground
2	NC	Not Connected
3	LVDSA3	Differential Data 3 (+)
4	LVDSA3#	Differential Data 3 (-)
5	GND	Ground
6	LVDSCLK0	Differential Clock (+)
7	LVDSCLK0#	Differential Clock (-)
8	GND	Ground
9	LVDSA2	Differential Data 2 (+)
10	LVDSA2#	Differential Data 2 (-)
11	GND	Ground
12	LVDSA1	Differential Data 1 (+)
13	LVDSA1#	Differential Data 1 (-)
14	GND	Ground
15	LVDSA0	Differential Data 0 (+)
16	LVDSA0#	Differential Data 0 (-)
17	GND	Ground
18	GND	Ground
19	+3.3V	+3.3V (Protected)
20	+3.3V	+3.3V (Protected)

The +3.3V power provided to pins 19 and 20 of J2 is protected by a software-controllable power switch (1 A, maximum.). This switch is controlled by the FP_VDDEN signal from the flat panel interface in the video controller.

LVDS TO VGA ADAPTER

A VGA monitor can be attached to the J2 connector using the VL-CBR-2014 LVDS to VGA adapter card. Use the following procedure to do this.

1. Plug the "Host End" of the LVDS cable VL-CBR-2015 into connector J2.
2. Plug the LVDS cable into connector J1 of the VL-CBR-2014 adapter card as shown in Figure 3.
3. Attach the VGA monitor data cable to connector CN1 of the VL-CBR-2014 adapter cable.



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Figure 3. VL-CBR-2014 LVDS to VGA Adapter Card

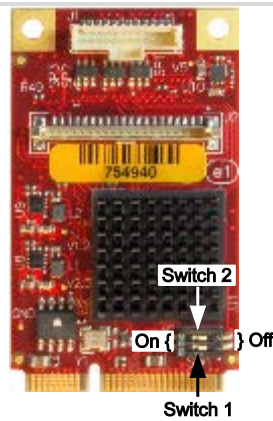
LVDS Resolution Switch

The two switches at location SW1 provide several startup options for standard LVDS flat panel types. If these options do not match the requirements of the panel you are using, contact Support@VersaLogic.com for a custom video BIOS. Table 5 lists the available startup resolutions.

Table 5: LVDS Startup Resolution Switch Settings

Switch 1	Switch 2	Resolution
Off	Off	640 x 480 (default)
On	Off	800 x 600
Off	On	1024 x 768
On	On	1280 x 1024

Figure 4 shows the location of the switches as well as their Off/On positions.



V7_012

Figure 4. LVDS Resolution Switch Positions



Appendix A – Technical Notes

Drivers

Linux and Windows drivers for the VL-MPEe-V5 are available for download on the [VL-MPEe-V5 Product Support Page](#).

BIOS Configuration

The VL-MPEe-V5 can be installed on CPU boards with no graphics controller or with an on-board graphics controller (either in a separate chip or integrated into the processor). In cases where an on-board graphics controller is to be used at the same time as the VL-MPEe-V5, it is typically necessary to configure the BIOS of the CPU board so that it recognizes the on-board controller as the primary graphics device. This is because when the CPU board detects the presence of an add-on graphics controller, the on-board controller is usually not fully initialized. Identifying the on-board device as the primary graphics controller resolves this issue.

See the BIOS or CMOS Setup Reference article in the [VersaTech KnowledgeBase](#) for your CPU board to determine how to configure the primary graphics controller in the BIOS, or contact [VersaLogic Customer Support](#).