



Reference Manual

REV. October 2020

VL-MPEe-E5E

MiniPCIe Dual Ethernet Module





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Product Revision Notes

Revision 1.0 – Initial release.

Revision 1.1 – Updated table 2 - J1 Ethernet connect pinout.

Revision 1.2 – Updated table 2 – Corrected pinout numbers.

Revision 1.3 – Added Ethernet Connector Pinout figure.

Revision 1.4 – Updated product dimensions.

Support

The [VL-MPEe-E5E product page](#) contains additional information and resources for this product including:

- Reference Manual (PDF format)
- Device drivers
- Data sheets and manufacturers links for chips used in this product
- Photograph of the circuit board

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Description

FEATURES AND CONSTRUCTION

The VL-MPEe-E5E is an extremely small and rugged module for connecting Gigabit Ethernet cables. This industry-standard Mini PCIe module provides an easy and economical way to add an Ethernet interface to embedded computer systems. The board's features include:

- Dual 10BaseT/100BaseTX/1000BaseT ports
- Rugged, right-angle latching connector
- Industrial temperature operation
- PCIe Signaling - Compatible with Mini PCIe sockets
- RoHS-compliant
- Customization available
- Supported by industry-standard operating systems including Windows* 10 and Linux Ubuntu*
- Network Boot Capability

This module supports dual bi-directional Ethernet channels using a 16-pin Molex Klik-Mate* latching connector for a secure connection. It is designed to be rugged and robust for use in industrial and military applications. The VL-MPEe-E5E features a wide operating temperature range (-40° to +85°C).

VL-MPEe-E5E boards are subjected to 100% functional testing and are backed by a limited two-year warranty. Careful parts sourcing and US-based technical support ensure the highest possible quality, reliability, service, and product longevity for this exceptional board.

Technical Specifications

Specifications are subject to change without notification.

Board Size:

30.00 mm x 50.95 mm x 10.48 mm (Mini PCIe standard)

Storage Temperature:

-40° to +85°C

Operating Temperature:

-40° to +85°C Derate -1.1°C per 305m (1,000 ft.) above 2,300m (7,500 ft.).

The ambient air surrounding the MPEe-E5E must be at or below +85°C.

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

3.3V @ 2.2W

(supplied from the Mini PCIe socket)

Ethernet:

Two autodetect
10BaseT/100BaseTX/1000BaseT ports (Intel I210-based Ethernet controllers)

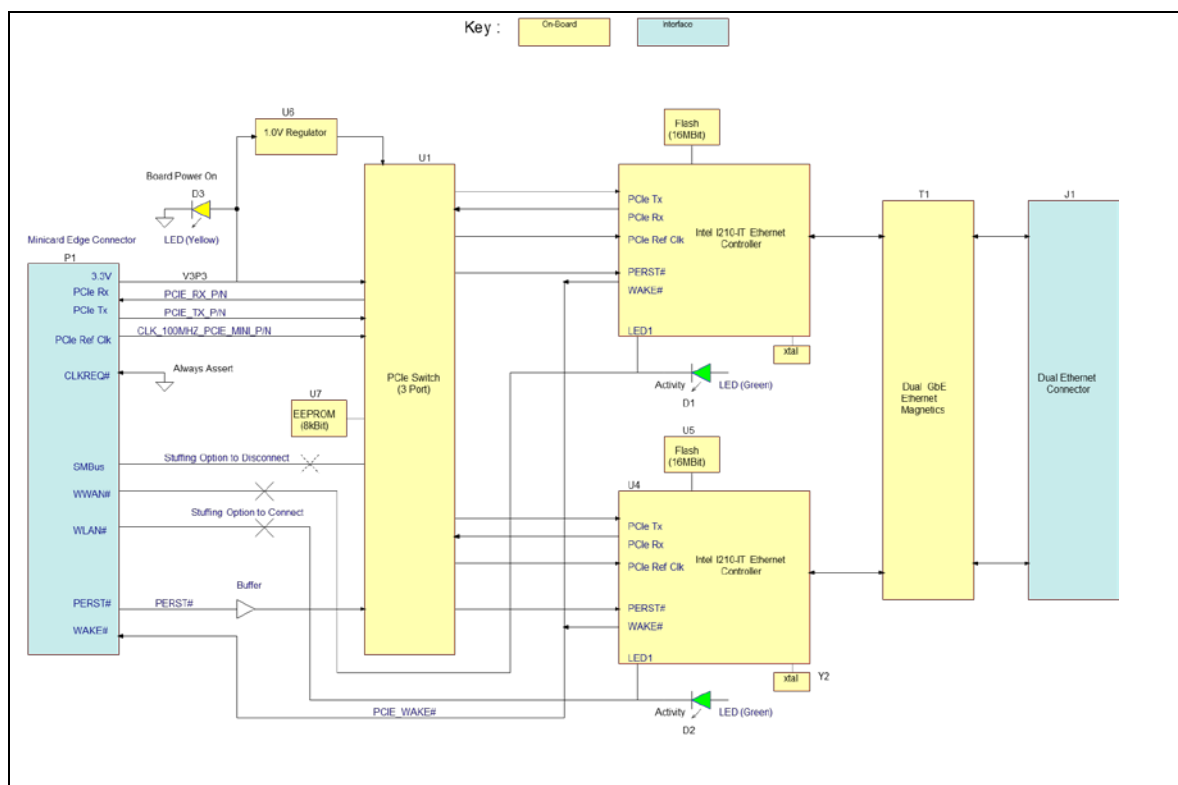
Mini PCIe Signal Type:

PCI Express Gen 1/2

Weight:

0.41 oz. (11grams)

Block Diagram



RoHS Compliance

The VL-MPEe-E5E is RoHS-compliant.

ABOUT RoHS

In 2003, the European Union issued Directive 2002/95/EC regarding the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment.

The RoHS directive requires producers of electrical and electronic equipment to reduce to acceptable levels the presence of six environmentally sensitive substances: lead, mercury, cadmium, hexavalent chromium, and the presence of polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) flame retardants, in certain electrical and electronic products sold in the European Union (EU) beginning July 1, 2006.

VersaLogic Corp. is committed to supporting customers with high-quality products and services meeting the European Union's RoHS directive.

Warnings

ELECTROSTATIC DISCHARGE

Warning! 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.

Note: The exterior coating on some metallic antistatic bags is sufficiently conductive to cause excessive battery drain if the bag comes in contact with the bottom side of the board.

HANDLING CARE

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

Technical Support

If you are unable to solve a problem after reading this manual, please visit the [VL-MPEe-E5E product page](#). This page provides links to component datasheets and device drivers.

The VersaTech KnowledgeBase contains a wealth of technical information about VersaLogic products, along with product advisories.

If you have further questions, 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 your e-mail address
- The name of a technician or engineer that can be contacted if any questions arise
- 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. Please specify the shipping method you prefer and provide a purchase order number for invoicing the repair.

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

Board Layout and Mounting

VL-MPEE-E5E MOUNTING

The VL-MPEE-E5E 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.

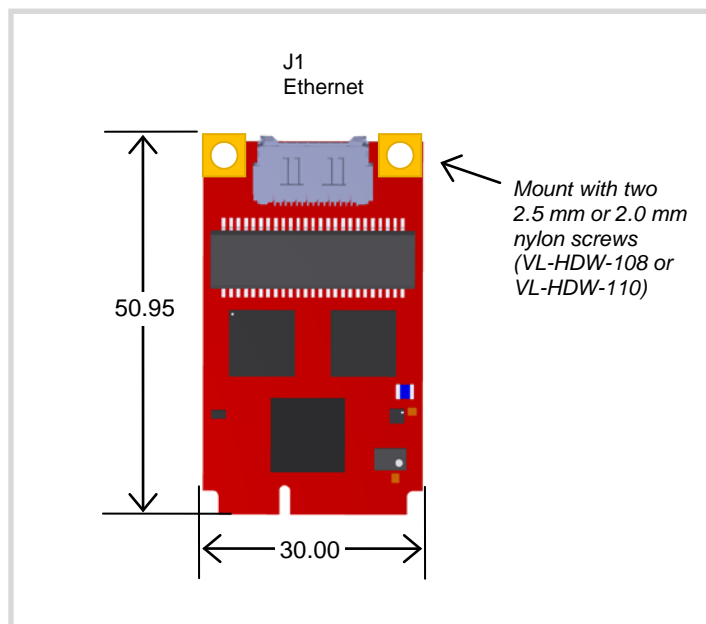
Note: Be careful not to over tighten the nylon mounting screws. Optimum tightness is 1 lbf-in (0.1 N-m).

VL-MPEE-E5E DIMENSIONS AND CONNECTORS

The VL-MPEE-E5E complies with MiniPCIe Mini Card (full size) dimensional standards. Dimensions are given below to help with pre-production planning and layout.

Figure 1. VL-MPEE-E5E Dimensions and Connectors

(Not to scale. All dimensions in millimeters.)



The next table provides information about the function, mating connectors, and transition cables for VL-MPEE-E5E connectors.

Table 1. Connector Functions and Interface Cables

Connector	Function	Mating Connector	Transition Cable	Cable Description
J1	Dual-Ethernet Connector	Molex P/N 503149-1600 16-pin CLIK-Mate* connector	VL-CBR-1604	Latching Ethernet cable

Interfaces and Connectors

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Ethernet

The VL-MPEe-E5E features two Intel I210-IT* Gigabit Ethernet Controllers each with a Gen 2 PCIe interface. Each controller has a green Link/Status LED on board with an option to connect it to the minicard connector LED pins.

ETHERNET CONNECTORS

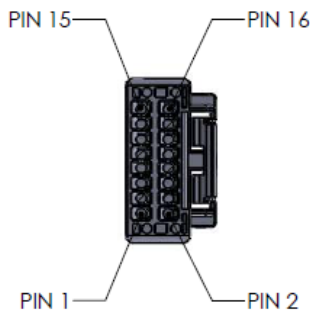
A rugged, 16-pin, latching Ethernet connectors (J1) are provided to enable connection with a Category 5 or 6 Ethernet cable. The Ethernet controller auto-negotiates connection speed.

Pinout details are below.

Table 2. J1 Ethernet Connector Pinout

	Pin	10/100 Signals	10/100/1000 Signals		Pin	10/100 Signals	10/100/1000 Signals	
Port 0	1	- Auto Switch (Tx or Rx)	BI_DD-		2	+ Auto Switch (Tx or Rx)	BI_DD+	Port 0
	3	- Auto Switch (Tx or Rx)	BI_DB-		4	+ Auto Switch (Tx or Rx)	BI_DB+	
	5	- Auto Switch (Tx or Rx)	BI_DC-		6	+ Auto Switch (Tx or Rx)	BI_DC+	
	7	- Auto Switch (Tx or Rx)	BI_DA-		8	+ Auto Switch (Tx or Rx)	BI_DA+	
Port 1	9	- Auto Switch (Tx or Rx)	BI_DD-		10	+ Auto Switch (Tx or Rx)	BI_DD+	Port 1
	11	- Auto Switch (Tx or Rx)	BI_DB-		12	+ Auto Switch (Tx or Rx)	BI_DB+	
	13	- Auto Switch (Tx or Rx)	BI_DC-		14	+ Auto Switch (Tx or Rx)	BI_DC+	
	15	- Auto Switch (Tx or Rx)	BI_DA-		16	+ Auto Switch (Tx or Rx)	BI_DA+	

Figure 2. Ethernet Connector Pinout and Orientation



ETHERNET LEDs

Green/yellow LEDs indicate Ethernet and power status. LED D3 indicates power status and Ethernet activity, and LED D1 and D2 indicate link speed.

Table 3. On-board LEDs

LED	Ref Des	State	Description
Green Link/Status LED for Ethernet Port 0	D1	On - Green	Link Good (pulses with activity)
		Off	Link is not good or cable is not connected
Green LED Link/Status LED for Ethernet Port 1	D2	On - Green	Link Good (pulses with activity)
		Off	Link is not good or cable is not connected
Yellow Power-On LED	D3	On - Yellow	3.3V power is applied to the Minicard
		Off	Minicard is not powered

PCIe Minicard Edge Connector

Table 4. Minicard Edge Connector Signals

Pin	Signal Name	Mini Card Function	Description
1	WAKE#	Wake	Wakeup signal to Host (the WAKE# signals from the two I210-IT Ethernet controllers are connected together and drive this signal. There is a stuffing option to disconnect this signal)
2	3.3VAUX	3.3V auxiliary source	3.3V power
3	NC	Not connected	--
4	GND	Ground	GND
5	NC	Not connected	--
6	1.5V	1.5V power	NC on MPEe-E5E
7	CLKREQ#	Reference clock request	REFCLK Clock Request
8	NC	Not connected	--
9	GND	Ground	GND
10	NC	Not connected	--
11	REFCLK-	Reference clock input -	100Mhz Ref Clock input to PCIe Switch
12	NC	Not connected	--
13	REFCLK+	Reference clock input +	100Mhz Ref Clock input to PCIe Switch
14	NC	Not connected	--
15	GND	Ground	GND
16	NC	Not connected	--
17	NC	Not connected	--
18	GND	Ground	GND
19	NC	Not connected	--
20	W_DISABLE#	Wireless disable	NC on MPEe-E5E
21	GND	Ground	GND

Pin	Signal Name	Mini Card Function	Description
22	PERST#	Card reset	Reset for MPEe-E5E to PCIe Switch (through a buffer)
23	PERn0	PCIe receive –	PCIe output from MPEe-E5E PCIe Switch
24	3.3VAUX	3.3V auxiliary source	3.3V power
25	PERp0	PCIe receive +	PCIe output from MPEe-E5E PCIe Switch
26	GND	Ground	GND
27	GND	Ground	GND
28	1.5V	1.5V power	NC on MPEe-E5E
29	GND	Ground	GND
30	SMB_CLK	SMBus clock	NC on MPEe-E5E
31	PETn0	PCIe transmit –	PCIe input to MPEe-E5E PCIe Switch
32	SMB_DATA	SMBus data	NC on MPEe-E5E
33	PETp0	PCIe transmit +	PCIe input to MPEe-E5E PCIe Switch
34	GND	Ground	GND
35	GND	Ground	GND
36	USB_D-	USB data –	NC on MPEe-E5E
37	GND	Ground	GND
38	USB_D+	USB data +	NC on MPEe-E5E
39	3.3VAUX	3.3V auxiliary source	3.3V power
40	GND	Ground	GND
41	3.3VAUX	3.3V auxiliary source	3.3V power
42	LED_WWAN#	Wireless WAN LED	Stuffing option to connect this to Ethernet Port 0 I210-IT Ethernet Controller Link/Status LED. Not stuffed.
43	GND	Ground	GND
44	LED_WLAN#	Wireless LAN LED	Stuffing option to connect this to Ethernet Port 1 I210-IT Ethernet Controller Link/Status LED. Not stuffed.
45	NC	Not connected	--
46	LED_WPAN#	Wireless PAN LED	Not Used on MPEe-E5E
47	NC	Not connected	--
48	1.5V	1.5V power	Not Used on MPEe-E5E
49	NC	Not connected	--
50	GND	Ground	GND
51	NC	Not connected	--
52	3.3VAUX	3.3V auxiliary source	3.3V power