

Reference Manual

DOC. REV. 3/31/2011

VL-EPM-E2

PC/104-*Plus* Ethernet Module



VERSALOGIC
CORPORATION



WWW.VERSALOGIC.COM

4211 West 11th Ave.
Eugene, OR 97402
(541) 485-8575
Fax (541) 485-5712

Copyright © 2011 VersaLogic Corp. All rights reserved.

Notice:

Although every effort has been made to ensure this document is error-free, VersaLogic makes no representations or warranties with respect to this product and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose.

VersaLogic reserves the right to revise this product and associated documentation at any time without obligation to notify anyone of such changes.

PC/104 and the PC/104 logo are trademarks of the PC/104 Consortium. All other trademarks are the property of their respective owners.

Product Release Notes

Rev 1.0 Release

Initial commercial release.

Support

The VL-EPM-E2 support page, at <http://www.versalogic.com/private/epme2support.asp>, contains additional information and resources for this product including:

- Reference Manual (PDF format)
- Operating system information and software drivers
- Datasheets and manufacturers' links for chips used in this product

This is a private page for VL-EPM-E2 users that can be accessed only by entering this address directly. It cannot be reached from the public VersaLogic website.

The VersaTech KnowledgeBase is an invaluable resource for resolving technical issues with your VersaLogic product.

[VersaTech KnowledgeBase](#)

Contents

Introduction	1
Description.....	1
Technical Specifications	1
RoHS Compliance	2
About RoHS.....	2
Warnings.....	2
Electrostatic Discharge	2
Handling Care.....	2
Earth Ground Requirement.....	2
Technical Support.....	3
Repair Service.....	3
Physical Details.....	4
Dimensions and Mounting.....	4
Hardware Assembly.....	5
Stack Arrangement Example	5
External Connectors and Jumper Block.....	6
Connectors and Jumper Block	6
Connector Functions and Interface Cables	8
Jumper Summary	8
Interfaces and Connectors	9
Ethernet.....	9
Ethernet LEDs.....	10
Appendix A – References.....	11

Description

The VL-EPM-E2 module provides a high-performance 10/100 Megabit per second (Mbps) Ethernet interface for PC/104-*Plus* systems. It is fully compatible with a wide selection of popular operating systems such as Windows, Windows Embedded, Linux, VxWorks, and QNX. Its features include:

- High-speed PCI interface
- Pass-through ISA interface
- Two independent 10/100 Ethernet ports with on-board MAC and configuration EEPROMs
- Interface for Link/Activity and Speed LEDs for each Ethernet port
- Single Ethernet port model available

The VL-EPM-E2 features high-reliability design and construction. VL-EPM-E2 boards are subjected to 100% functional testing and are backed by a limited two-year warranty. Careful part sourcing and US-based technical support ensure the highest possible quality, reliability, service, and product longevity for this exceptional module.

Technical Specifications

Board Size:

90 mm x 96 mm (3.55" x 3.78")

Storage Temperature:

-40° to +85°C

Operating Temperature:

-40° to +85°C

Power Requirements:

+5V @ 0.52A Amps (2.6 Watts max)

Ethernet Controller:

Micrel KSZ8841-PMQLI

Ethernet Buffer RAM:

Each port:

4 KB Transmit buffer

4 KB Receive buffer

Ethernet Connectors:

VL-EPM-E2A – one RJ45

VL-EPM-E2B – two RJ45

VL-EPM-E2D – two 2x4 2 mm latching headers

Compatibility:

PC/104-*Plus* (PCI + ISA)

Weight:

VL-EPM-E2A – 0.159 lb (0.072 kg)

VL-EPM-E2B – 0.183 lb (0.083 kg)

VL-EPM-E2D – 0.174 lb (0.079 kg)

Specifications are subject to change without notification.

RoHS Compliance

The VL-EPM-E2 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.

HANDLING CARE

Warning! Care must be taken when handling the board not to touch the exposed circuitry with your fingers. Though it will not damage the circuitry, it is possible that small amounts of oil or perspiration on the skin could have enough conductivity to cause the contents of CMOS RAM to become corrupted through careless handling, resulting in CMOS resetting to factory defaults.

EARTH GROUND REQUIREMENT

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

Technical Support

If you are unable to solve a problem after reading this manual, please visit the VL-EPM-E2 product support web page below. The support page provides links to component datasheets, device drivers, and BIOS and PLD code updates.

[VL-EPM-E2 Support Page](http://www.versalogic.com/private/epme2support.asp)

<http://www.versalogic.com/private/epme2support.asp>

The VersaTech KnowledgeBase contains a wealth of technical information about VersaLogic products, along with product advisories. Click the link below to see all KnowledgeBase articles related to the VL-EPM-E2.

[VersaTech KnowledgeBase](#)

If you have further questions, contact VersaLogic Technical Support at (541) 485-8575. 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 (541) 485-8575. 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
- 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 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.

Dimensions and Mounting

The VL-EPM-E2 complies with PC/104 dimensional standards. Dimensions are given below to help with pre-production planning and layout.

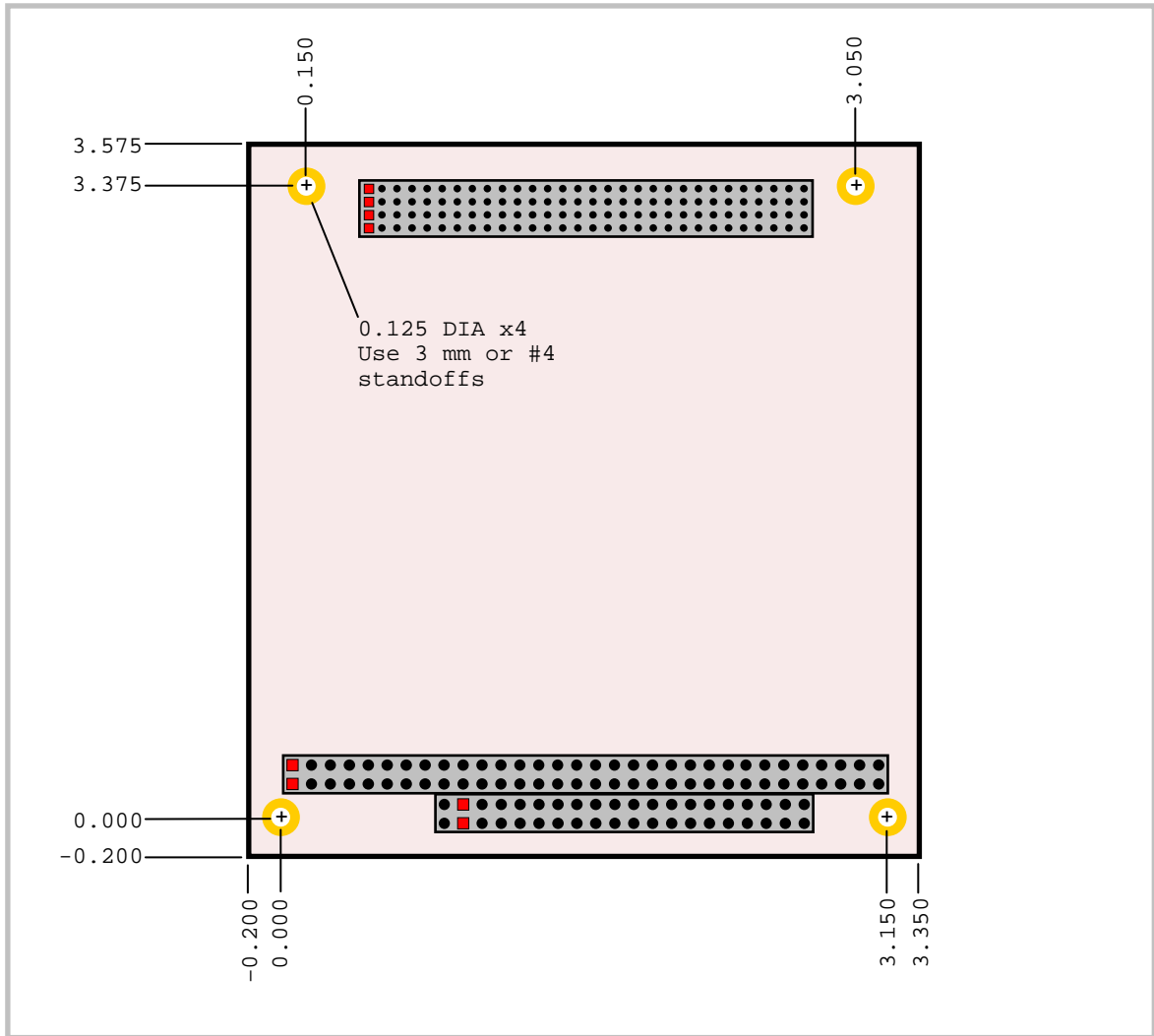


Figure 1. VL-EPM-E2 Dimensions and Mounting Holes
(Not to scale. All dimensions in inches.)

HARDWARE ASSEMBLY

The VL-EPM-E2 uses both PC/104-*Plus* (PCI + ISA) connectors so that the module can be installed in PCI stack position 0-3. As shipped, the VL-EPM-E2 is configured for position 0 (first on the stack adjacent to the CPU board). Make sure that jumper V1 matches the chosen stack position (see Jumper Summary). PC/104 (ISA) modules must not be positioned between the VL-EPM-E2 and any PC/104-*Plus* (PCI + ISA) modules on the stack.

The entire assembly can sit on a table top or be secured to a base plate. When bolting the unit down, make sure to secure all four standoffs to the mounting surface to prevent circuit board flexing. Standoffs are secured to the top circuit board using four pan head screws. Standoffs and screws are available as part number VL-HDW-105 (metric thread) or VL-HDW-106 (English thread).

An extractor tool is available (part number VL-HDW-201) to separate modules from the stack. Use caution when using the extractor tool not to damage any board components.

STACK ARRANGEMENT EXAMPLE

The figure below shows the VL-EPM-E2 installed on the bottom of the PC/104-*Plus* stack. The module can be installed in slots 0-3. Jumper block V1 must be configured to match the module's stack position.

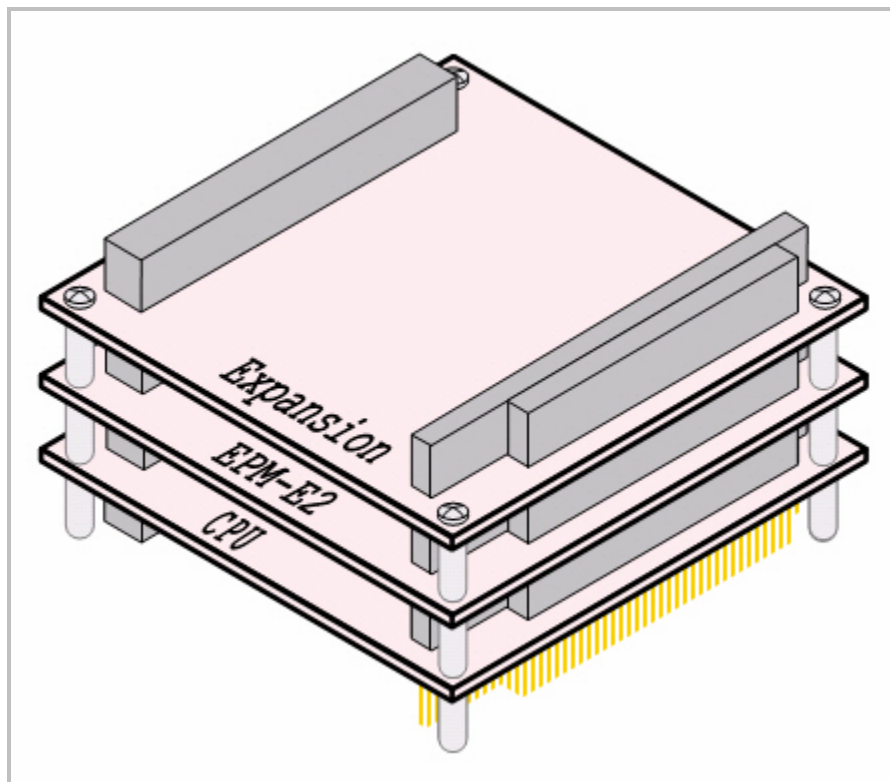


Figure 2. Stack Arrangement Example

External Connectors and Jumper Block

CONNECTORS AND JUMPER BLOCK

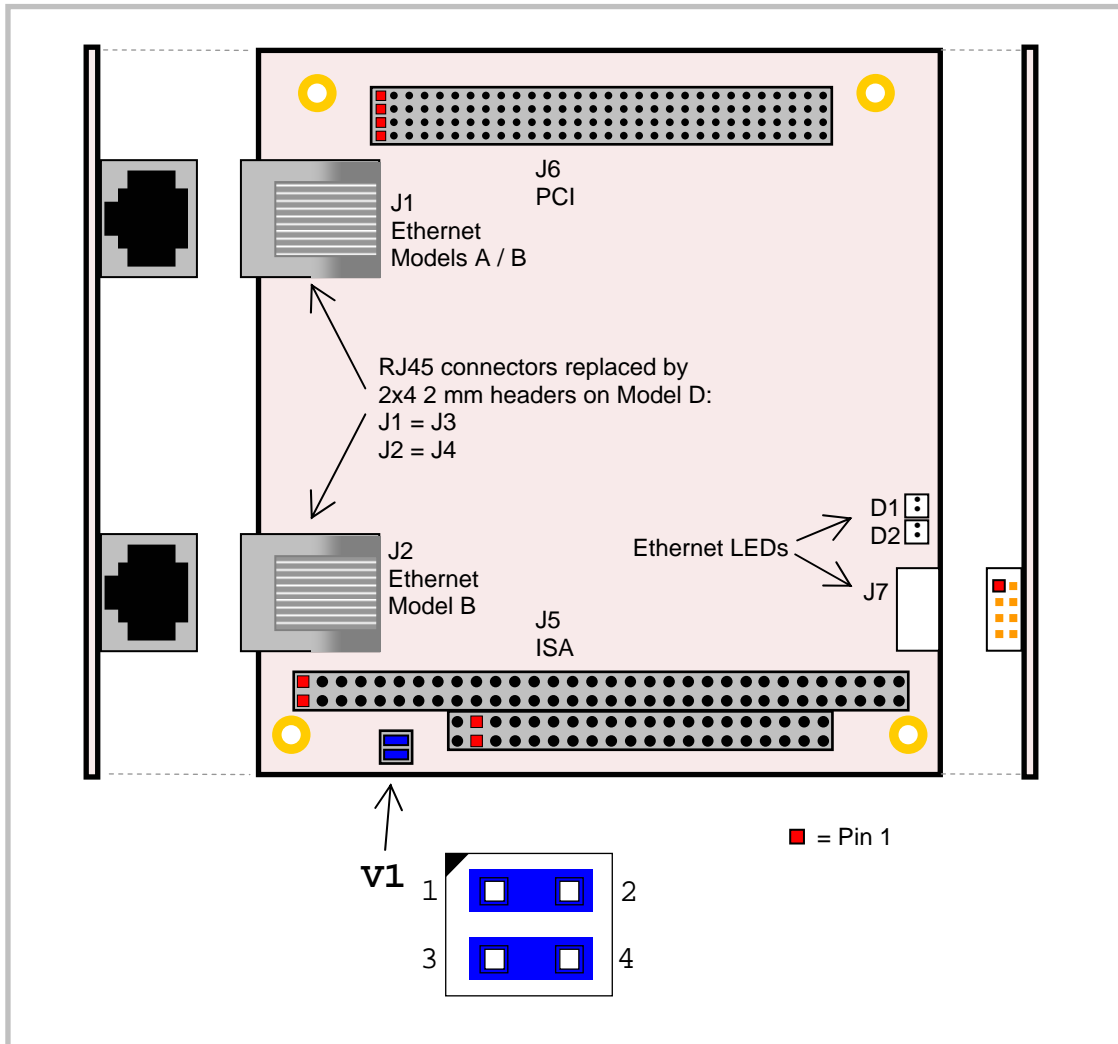


Figure 3. VL-EPM-E2 Connectors and Jumper Block – Top Side

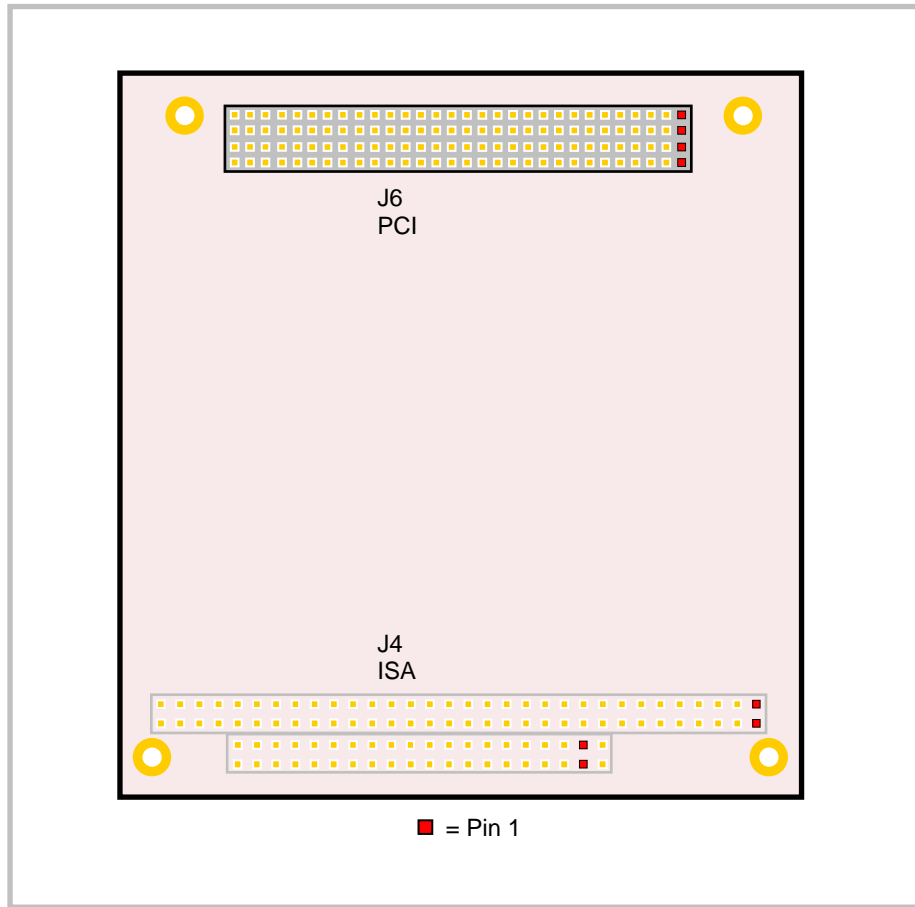


Figure 4. VL-EPM-E2 Connectors – Bottom Side

CONNECTOR FUNCTIONS AND INTERFACE CABLES

Table 1 provides information about the function, mating connectors, and transition cables for VL-EPM-E2 connectors.

Table 1: Connector Functions and Interface Cables

Connector	Function	Mating Connector	Transition Cable	Cable Description	Pin 1 Location ¹		Page
					x coord.	y coord.	
J1	Ethernet Port 1 ²	RJ45	—	—	0.180	2.679	9
J2	Ethernet Port 2 ³	RJ45	—	—	0.180	0.754	9
J3	Ethernet Port 1 ⁴	FCI 10073599-008LF housing; FCI 10044403-101 crimp	VL-CBR-0804	12" Ethernet adapter cable	0.133	2.561	9
J4	Ethernet Port 2 ⁴	FCI 10073599-008LF housing; FCI 10044403-101 crimp	VL-CBR-0804	12" Ethernet adapter cable	0.131	0.017	9
J5	ISA	AMP 1375795-2	—	—	0.050	0.200	—
J6	PCI	AMP 1375799-1	—	—	0.450	3.139	—
J7	Ethernet LEDs	FCI 10073599-008LF housing; FCI 10044403-101 crimp	—	—	3.025	0.805	10

1. Origin is the lower left mounting hole as shown in Figure 3. All coordinates in inches.
2. Models A and B.
3. Model B.
4. Model D.

JUMPER SUMMARY

Table 2: Jumper Summary

Jumper Block	Description	As Shipped															
V1[1-2] V1[2-3]	PCI Slot Assignment. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>PCI Slot</u></th> <th style="text-align: center;"><u>V1[3-4]</u></th> <th style="text-align: center;"><u>V1[1-2]</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Slot 0</td> <td style="text-align: center;">In</td> <td style="text-align: center;">In</td> </tr> <tr> <td style="text-align: left;">Slot 1</td> <td style="text-align: center;">In</td> <td style="text-align: center;">Out</td> </tr> <tr> <td style="text-align: left;">Slot 2</td> <td style="text-align: center;">Out</td> <td style="text-align: center;">In</td> </tr> <tr> <td style="text-align: left;">Slot 3</td> <td style="text-align: center;">Out</td> <td style="text-align: center;">Out</td> </tr> </tbody> </table>	<u>PCI Slot</u>	<u>V1[3-4]</u>	<u>V1[1-2]</u>	Slot 0	In	In	Slot 1	In	Out	Slot 2	Out	In	Slot 3	Out	Out	Slot 0
<u>PCI Slot</u>	<u>V1[3-4]</u>	<u>V1[1-2]</u>															
Slot 0	In	In															
Slot 1	In	Out															
Slot 2	Out	In															
Slot 3	Out	Out															

Ethernet

The Ethernet interface, based on a Micrel KSZ8441-PQML controller, provides a standard 10baseT and 100baseTX network interface. Software drivers are available for a wide variety of operating systems to provide a complete high-performance networking solution. The Ethernet controller features both Auto-Negotiation and automatic MDI/MDI-X cable crossover detection.

Table 3: VL-EPM-E2 Ethernet Connector (J1 and J2) Pinout Models A and B¹

J1/J2 Pin	Signal Name	Function
1	TD+	Transmit Data Positive
2	TD-	Transmit Data Negative
3	RD+	Receive Data Positive
4	GND	Isolated Ground ²
5	GND	Isolated Ground
6	RD-	Receive Data Negative
7	GND	Isolated Ground
8	GND	Isolated Ground

Table 4: VL-EPM-E2 Ethernet Connector (J3 and J4) Pinout Model D¹

J3/J4 Pin	Signal Name	Function
1	GND	Isolated Ground
2	GND	Isolated Ground
3	RD-	Receive Data Negative
4	RD+	Receive Data Positive
5	GND	Isolated Ground
6	GND	Isolated Ground
7	TD-	Transmit Data Negative
8	TD+	Transmit Data Positive

1. Tables show the MDI default pinout. The Tx and Rx pairs reverse when the controller switches to MDI-X mode.

2. Ground pins isolated to reduce EMI.

Ethernet LEDs

The VL-EPM-E2 provides two on-board Ethernet LEDs that indicate Ethernet status. LED D1 is for Ethernet Port 1, and D2 is for Port 2. The table below shows the behavior of these LEDs.

Table 5: Ethernet Status LEDs

LED	State	Description
Green (Link/Activity)	On	Active Ethernet cable plugged in. No Tx/Rx data activity.
	Off	Cable not plugged in. Cable not plugged into an active hub.
	Blinking	Active Ethernet cable plugged in. Tx or Rx data activity detected on the cable.
Yellow (Speed)	On	100BaseTX (fast) detected on Ethernet cable.
	Off	10BaseT (slow) detected on Ethernet cable.

In addition, the Ethernet status LED signals are routed to the header at J7, as shown in the table below.

Table 6: VL-EPM-E2 Ethernet LED Connector (J7) Pinout

J7 Pin	Signal Name	Function
1	V3_3	Protected +3.3V power
2	ETHA_LINKACT	Ethernet port 1 link/activity
3	V3_3	Protected +3.3V power
4	ETHA_SPEED	Ethernet port 1 speed
5	V3_3	Protected +3.3V power
6	ETHB_LINKACT	Ethernet port 2 link/activity
7	V3_3	Protected +3.3V power
8	ETHB_SPEED	Ethernet port 2 speed

Appendix A – References



Micrel KSZ8841-PMQL Ethernet Controller

[Datasheet](#)