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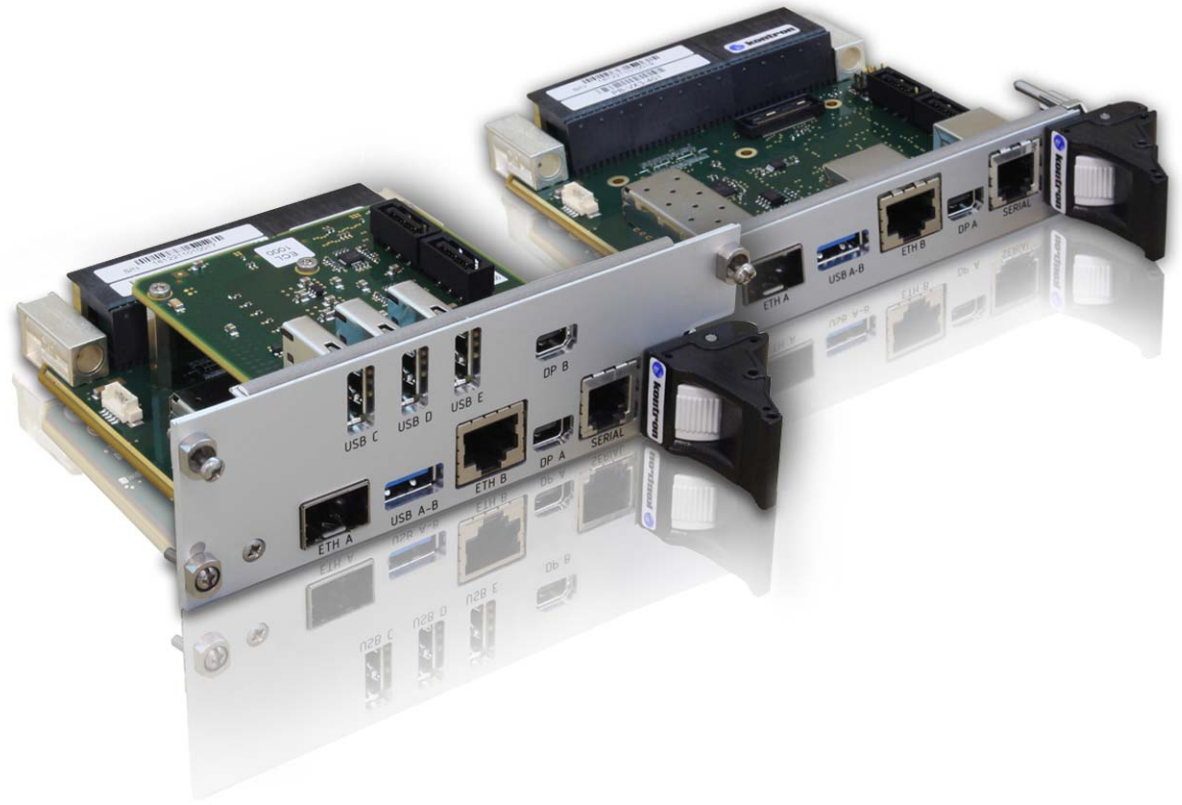
» PB-VX3-4xx «



3U-VPX Rear Transition Module User's guide

CA.DT.B03-0e - November 2012

Revision History

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- encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE
- improve the environmental performance of all those involved during the lifecycle of EEE

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This guide uses several types of notice: Note, Caution, ESD.

Note: this notice calls attention to important features or instructions.


Caution: this notice alert you to system damage, loss of data, or risk of personal injury.


ESD: This banner indicates an Electrostatic Sensitive Device.

All numbers are expressed in decimal, except addresses and memory or register data, which are expressed in hexadecimal. The prefix `0x' shows a hexadecimal number, following the `C' programming language convention.

The multipliers `k', `M' and `G' have their conventional scientific and engineering meanings of $*10^3$, $*10^6$ and $*10^9$ respectively. The only exception to this is in the description of the size of memory areas, when `K', `M' and `G' mean $*2^{10}$, $*2^{20}$ and $*2^{30}$ respectively.

When describing transfer rates, `k' `M' and `G' mean $*10^3$, $*10^6$ and $*10^9$ *not $*2^{10}$ $*2^{20}$ and $*2^{30}$.*

In PowerPC terminology, multiple bit fields are numbered from 0 to n, where 0 is the MSB and n is the LSB. PCI and CompactPCI terminology follows the more familiar convention that bit 0 is the LSB and n is the MSB.

Signal names ending with an asterisk (*) or a hash (#) denote active low signals; all other signals are active high.

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High Voltage Safety Instructions


Warning!
All operations on this device must be carried out by sufficiently skilled personnel only.


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Before installing a not hot-swappable Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks. Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

Special Handling and Unpacking Instructions

ESD Sensitive Device!
Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the board.

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.

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Chapter 1 - Introduction

The Kontron PB-VX3-4xx is a 3U VPX Rear Transition Module compliant with the definition of the Rear Transition Module on VPX Standard –VITA 46.10.

It provides rear I/O peripherals connectivity for Kontron VX30xx Single Board Computers.

Figure 1: PB-VX3-4xx 3U VPX Overview

1.1 Manual Overview

1.1.1 Objective

This guide provides general information, hardware instructions, operating instructions and functional description of the PB-VX3-4xx board.

This hardware technical documentation reflects the most recent version of the product. The "Hardware release Notes" (see section 1.8 "Related Publications") might help to keep track of potential evolutions.

Functional changes that differ from previous version of the document are identified by a vertical bar in the margin.

1.1.2 Audience

This guide is written to cover, as far as possible the range of people who will handle or use the PB-VX3-4xx, from unpackers/inspectors, through system managers and installation technicians to hardware and software engineers. Most chapters assume a certain amount of knowledge on the subjects of single board computer architecture, interfaces, peripherals, system, cabling, grounding and communications.

1.1.3 Scope

This guide describes all variants of the PB-VX3-4xx series.

1.1.4 Structure

This guide is structured in a way that will reflect the sequence of operations from receipt of the board up to getting it working in your system. Each topic is covered in a separate chapter and each chapter begins with brief introduction that tells you what the chapter contains. In this way, you can skip any chapters that are not applicable or with which you are already familiar.

The chapters are:

- Chapter 1 - Introduction (this chapter)
- Chapter 2 - PB-VX3-4xx Identification
- Chapter 3 - Installation and Configuration
- Chapter 4 - Physical I/O

1.2 VPX Overview

VPX (VITA 46) specifications establish a new direction for the next revolution in bus boards. VPX is an ANSI standard which breaks out from the traditional connector scheme of VMEbus to merge the latest in connector and packaging technology with the latest in bus and serial fabric technology. VPX combines best-in-class technologies to assure a very long technology cycle similar to that of the original VMEbus solutions. Traditional parallel VMEbus will continue to be supported by VPX through bridging schemes that assure a solid migration pathway.

For further information regarding this standards and its use, visit the home page of the VITA - Open Standards, Open Markets (http://www.vita.com)

1.3 Terminology, Definitions and Abbreviations

In this document, the term:

- PB-VX3-4xx will be associated to the the 3U VPX RTM board family, including PB-VX3-400, PB-VX3-401, PB-VX3-410 and PB-VX3-411
- SLM (Second Layer Module) wil be associated to PIM-VX3-410-1
- VX30xx will be associated to the 3U VPX board family, including VX304x, VX3030, VX3035

1.4 Ordering Information

Order Code	Front Panel Size (inch)	Description	Main Features
PB-VX3-400	4HP version (0.8)	Without SLM (PIM-VX3-410-1)	▸ VPX Rear I/O ▸ One Ethernet SFP+ cage operation at 1 or 10 Gbits/S ▸ One Ethernet 1000BASE-T port ▸ Up to two SATA III ports ▸ Two serial COM ports ▸ One USB 3.0 / USB 2.0 port ▸ Up to 5 GPIOs ▸ One mini display port ▸ One I2c bus connector
PB-VX3-401	5HP Version (1)		
PB-VX3-410	8 HP Version (1.6)	With SLM (PIM-VX3-410-1)	▸ PB-VX3-40x Features + ▸ Up to two SATA III ports ▸ 3 USB 2.0 ports ▸ One mini DisplayPort
PB-VX3-411	10 HP Version (2)		

Table 1: PB-VX3-4xx Order Code

1.5 Block Diagram

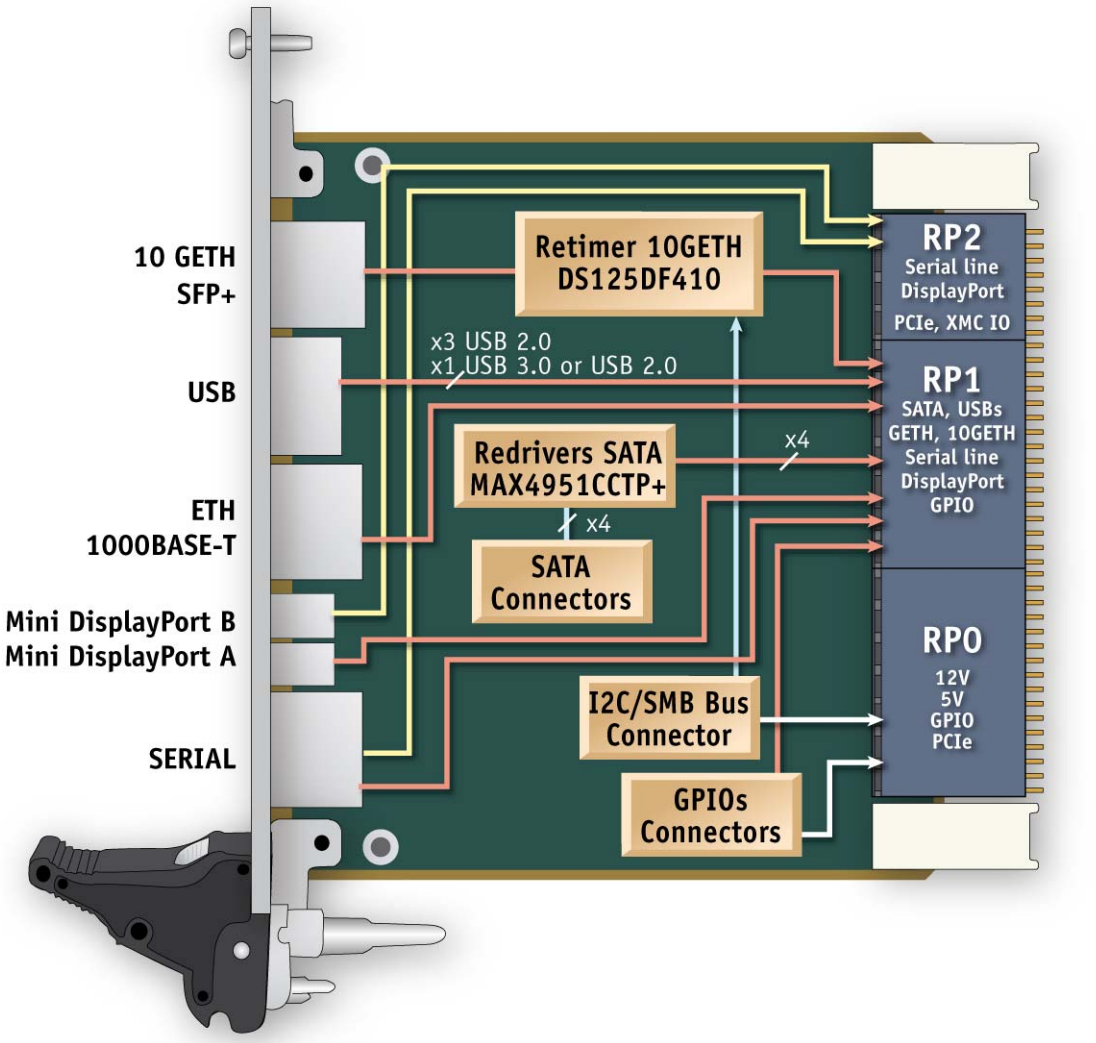


Figure 2: PB-VX3-4xx Block Diagram

1.6 Technical Specifications

Power Specification	
Supply Voltage	5V only
Consumption (W)	Idle 2.6 Typical 3 Max 3.1
Mechnical Specifications	
Front panel Size	1 slot (4HP or 5HP) for PB-VX3-40x 2 slot (8HP or 10HP) for PB-VX3-41x
Dimensions (mm)	100 x 81.5
Weight (g)	200 (8HP)
Environmental Specifications	
Conformal coating	Optional
Operating temperature	0°C to 55°C
Storage temperature	-55°C to 85°C
Relative humidity	99% non-condensing

Table 2: PB-VX3-4xx Technical Specifications

1.7 Reliability

The predicted MTBF according MIL-HDBK217F-2 standard are:

	GB		NS		ARW	AIC
	25°C	40°C	25°C	40°C	55°C	40°C
PIM-VX3-410-1	1 892 014h	1 199 421h	316 244h	199 065h	24 807h	145 396h
PB-VX3-40x	926 492h	633 281h	178 662h	130 476h	21 601h	105 344h
PB-VX3-41x	621 938h	414 454h	114 165h	78 816h	11 547h	61 086h

Table 3: PB-VX3-4xx MTBF

Calculations are made according to the standard MIL-HDBK217F-2 for following types of environment:

> Ground Benign (GB)

> Naval Sheltered (NS),

> Air Rotary Wing (ARW)

> Air Inhabited Cargo (AIC)

1.8 Related Publications

The following publications contain information relating to this product:

PRODUCT	PUBLICATION
Standard	
ANSI/VITA 46.0	VPX Baseline Standard - ANSI/VITA 46.0-2007
ANSI/VITA 46.7	Ethernet on VPX Fabric Connector, Revision 0.05 (October 13, 2008)
ANSI/VITA 46.9	PMC/XMC/GbE to 3U/6U VITA 46 Pin Mapping, Draft standard Rev. 0.24
ANSI/VITA 46.10	Rear Transition Module for VPX, Revision 0.8, November 2008
Serial ATA Revision 3.1 Specification	SATA III Specification (2011)
Serial ATA	Fast just Got Faster (May 27, 2009)
Serial ATA Revision 2.6	SATA II Specification
Universal Serial Bus 3.0 Specification Revision 1.0, Nov 12, 2008	Universal Serial Bus 3.0 Specification
USB 3.0 Errata (Released 06/09/2010)	USB 3.0 Errata
USB 3.0 Engineering Change Notice ECN9	USB 3.0 Engineering Change Notice
Hardware	
PB-VX3-4xx Boards	PB-VX3-4xx Hardware Release Notes CA.DT.B04

Table 4: Related Publications

Chapter 2 - PB-VX3-4xx Identification

2.1 Board Identification

The PB-VX3-4xx boards are identified by labels fitted to the top side and the bottom side of the board.

» Top Side

A "Identification" label: Order Code, Serial Number

Figure 3: PB-VX3-4xx Identification (Top Side)

Bottom Side

B "Identification" label: Variant, E.C. Level

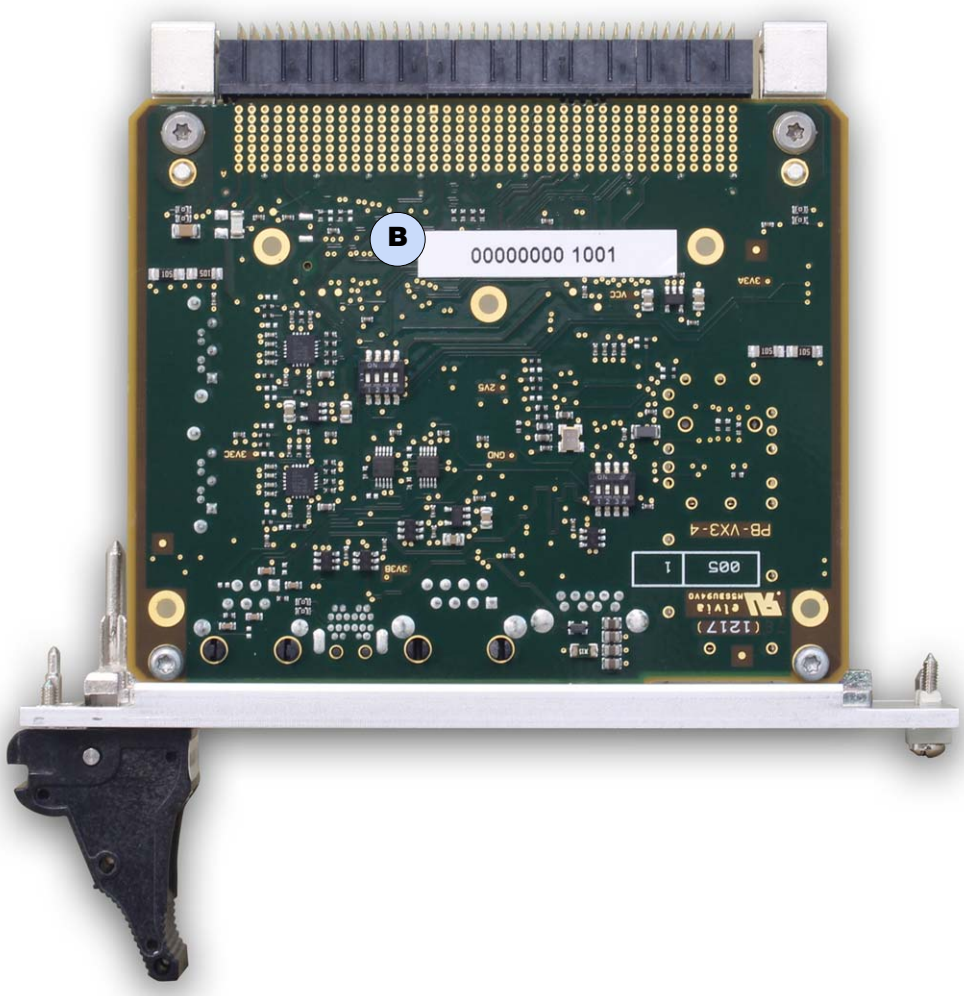


Figure 4: PB-VX3-4xx Identification (Bottom Side)

2.2 I/O Interfaces

2.2.1 Front Panel Connectors Identification

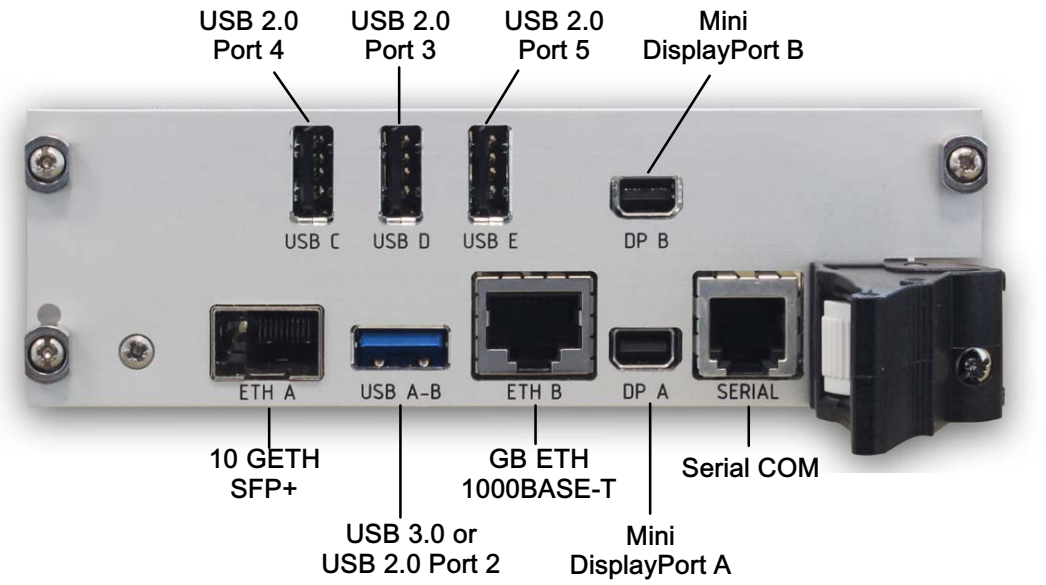


Figure 5: Location of the Front Panel Connectors

2.2.2 Front Panel Connectors Technical Specifications

Front Panel Name	Description	Comments
USB A-B	USB 3.0 Legacy interface Or USB 2.0 interface (port2)	
ETH A	10 Gigabit Ethernet interface implemented on SFP+ cage	Operate at 1 or 10 Gbits/s
ETH B	Gigabit Ethernet interface implemented on RJ-45 connector	1000BASE-T
SERIAL	COM: serial port , EIA-232, RJ-12 connector	COM0 : standard RJ-12 connexion COM1 : use KIT-2x-RJ12DB9 on this port.
DP A	Graphic: Mini DisplayPort A	
DP B	Graphic: Mini DisplayPort B	Available with PB-VX3-41x order code
USB C	USB 2.0 Interface port 4	Available with PB-VX3-41x order code
USB D	USB 2.0 Interface port 3	Available with PB-VX3-41x order code
USB E	USB 2.0 Interface port 5	Available with PB-VX3-41x order code

Table 5: Front Panel Connectors Technical Specifications

2.3 Component Layout

PB-VX3-4xx Top Side

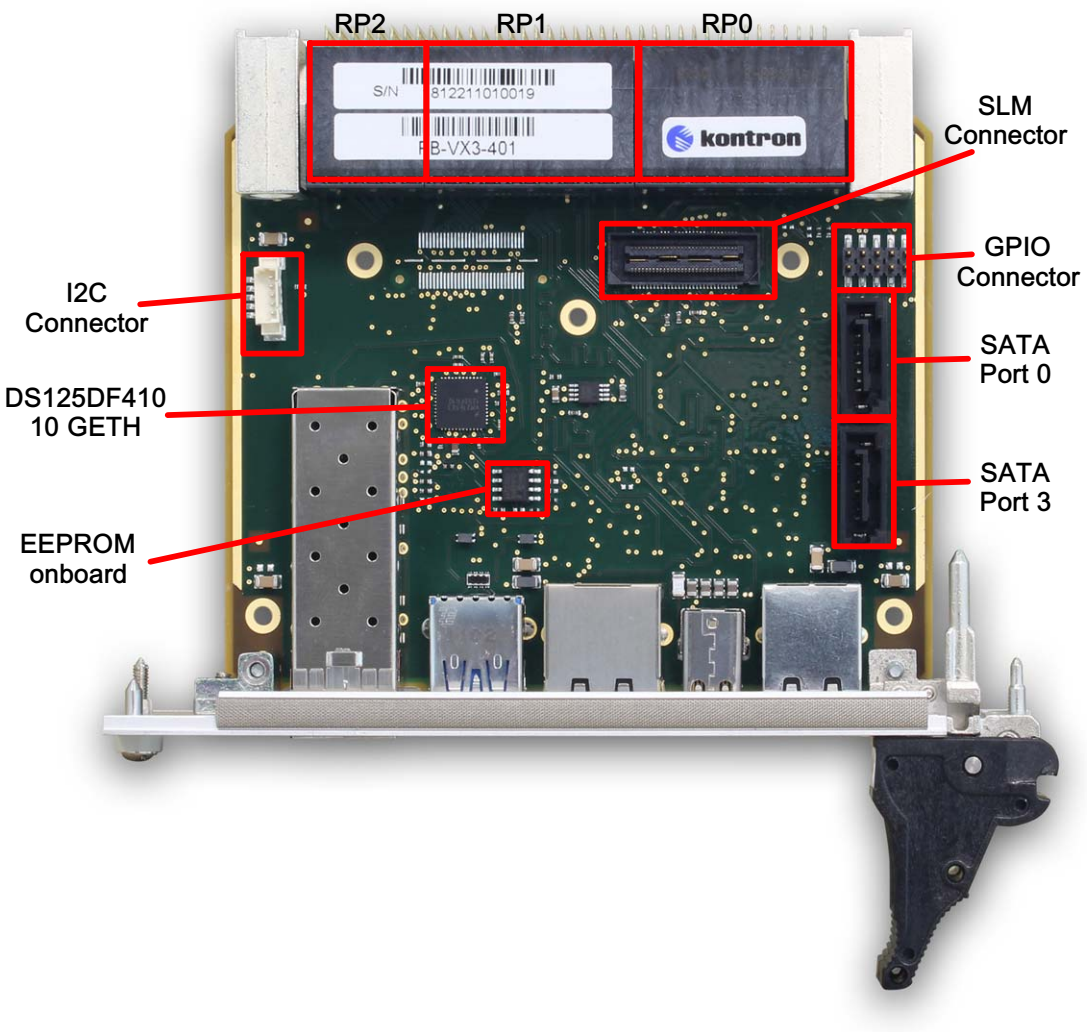


Figure 6: Component Layout of the PB-VX3-4xx Top Side

PB-VX3-4xx Bottom Side

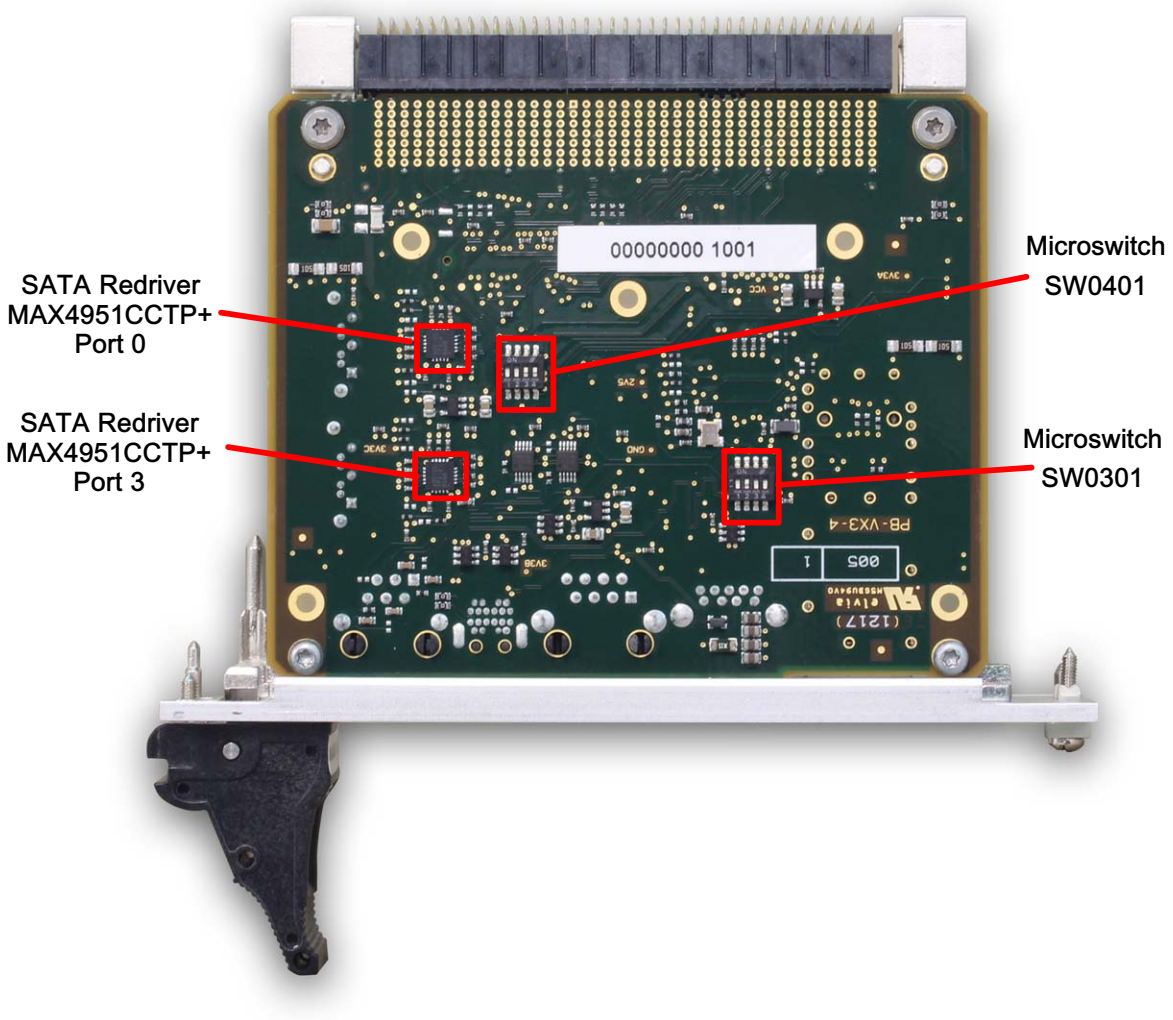


Figure 7: Component Layout of the PB-VX3-4xx Bottom Side

PIM-VX3-4xx Top Side

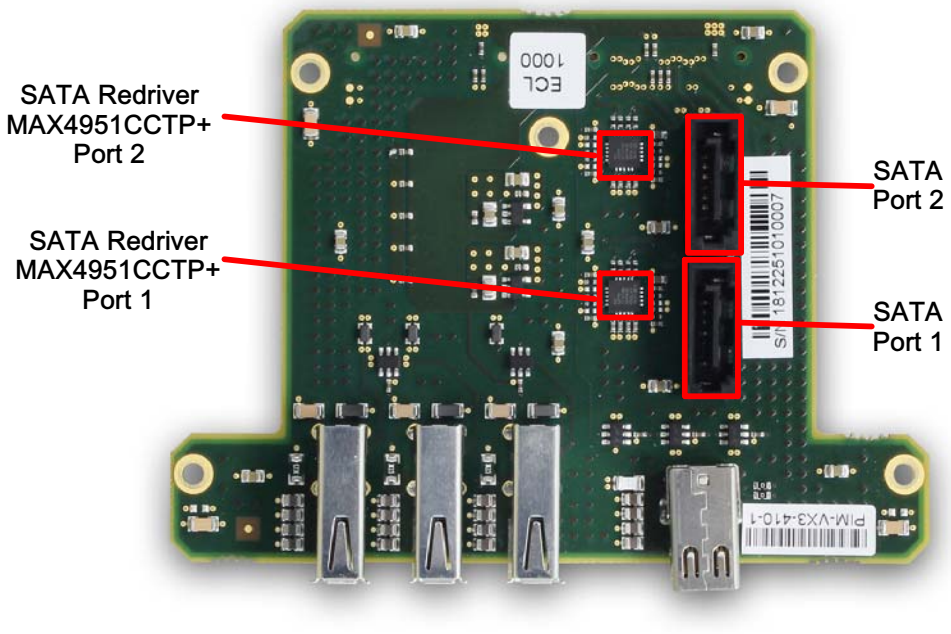


Figure 8: Component Layout of the PIM-VX3-4xx Top Side

Components Technical Specifications

		Description	Comments
Onboard Interface	SATA Port 0	SATA III compliant	
	SATA Port 1	SATA III compliant	Available with PB-VX3-41x order code
	SATA Port 2	SATA III compliant	Available with PB-VX3-41x order code
	SATA Port3	SATA III compliant	
	GPIO Connector	Up to 5 GPIOs	
	I2C Connector	SMB Bus	
Sata Redriver	MAXIM MAX4951CCTP+	6 Gbps SATA bidirectional Redriver with input equalization, preemphasis, and advanced power management	
10GETH Retimer	Texas instrument DS125DF410	Low power multirate quad channel retimer.	
EEPROM	One serial 256 Kbit EEPROM dedicated to 10 GETH retimer	optional	

Table 6: Components Technical Specifications

Chapter 3 - Installation and Configuration

The PB-VX3-4xx has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the board, other system components, or injury to personnel.

3.1 Safety Requirements

The following safety precautions must be observed when installing or operating the PB-VX3-4xx. Kontron assumes no responsibility for any damage resulting from failure to comply with these requirements.

This board contains electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to your board:

Discharge your clothing before touching the assembly. Tools must be discharged before use.

- Do not touch components, connector pins or traces.
- We strongly recommend our customers to work in an environment equipped with anti-static workbenches with professional discharging equipments.

3.2 Microswitches

3.2.1 Microswitches Location

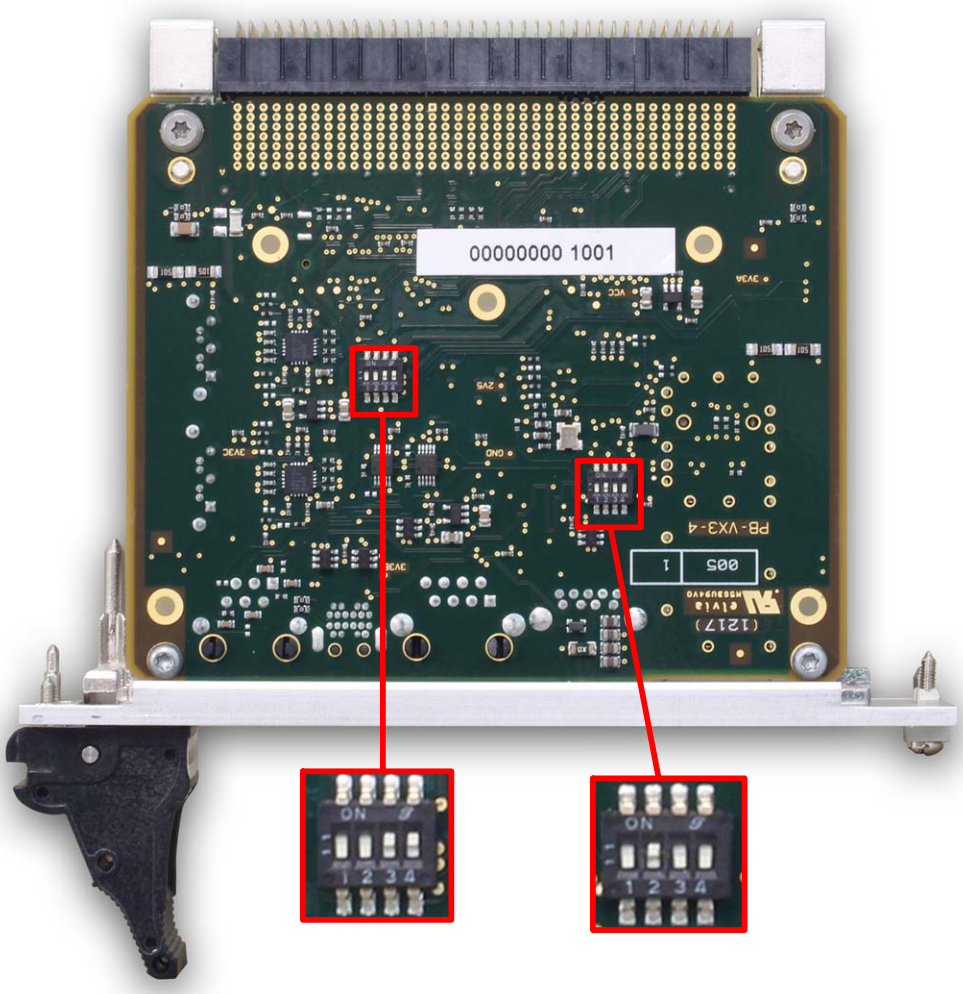


Figure 9: Microswitches Location (Bottom view)

Two microswitches are available on the PB-VX3-4xx: SW0301 and SW0401

3.2.2 Microswitch SW0301 Description

Function	Description
1 - EEPROM WP	**on:** The EEPROM is not write protected **off:** The EEPROM is write protected **Default setting**
2 - EN_SMB	**on:** The DS125DF410 10 GETH retimer is in slave mode **Default setting** **off:** The DS125DF410 10 GETH retimer is in master mode
3 - EN_REFCLK	**on:** The DS125DF410 10 GETH retimer has its internal clock reference activated **off:** The DS125DF410 10 GETH retimer has an external clock reference (25 MHz) **Default setting**
4 - Reserved	Shall be **off**

Table 7: Microswitch SW0301 Description

If the EEPROM is empty and the DS125DF410 is set in master mode, the retimer will not work at all. Refer to the DS125DF410 datasheet before using the master mode

The 10Gbits SFP+ Ethernet retimer present onboard has its own default signal integrity parameters that should be adequate for most applications. It is strongly recommended to keep these defaults setting.

However, it is possible to alter the default parameter settings of the redriver through a master or slave I2C interface.

In the master mode, the retimer will fetch its parameters from the EEPROM which can be programmed from the I2C connector.

In the slave mode, the parameters can be programmed from the VPX SMBus.

3.2.3 Microswitch SW0401 Description

Function	Description
1 - I2C CLK - Connector to backplane	**on:** The I2C CLK signal is connected from I2C connector to the backplane (RP0) **off:** The I2C CLK signal is not connected from I2C connector to the backplane (RP0) - **Default setting**
2 - I2C DAT - Connector to backplane	**on:** The I2C DAT signal is connected from I2C connector to the backplane (RP0) **off:** The I2C DAT signal is not connected from I2C connector to the backplane (RP0) - **Default setting**
3 - I2C DAT - Connector to EEPROM	**on:** The I2C DAT signal is connected from I2C connector to the EEPROM **Default setting** **off:** The I2C DAT signal is not connected from I2C connector to the EEPROM
4 - I2C CLK - Connector to EEPROM	**on:** The I2C CLK signal is connected from I2C connector to the EEPROM **Default setting** **off:** The I2C CLK signal is not connected from I2C connector to the EEPROM

Table 8: Microswitch SW0401 Description

3.3 RTM Connectors Identification

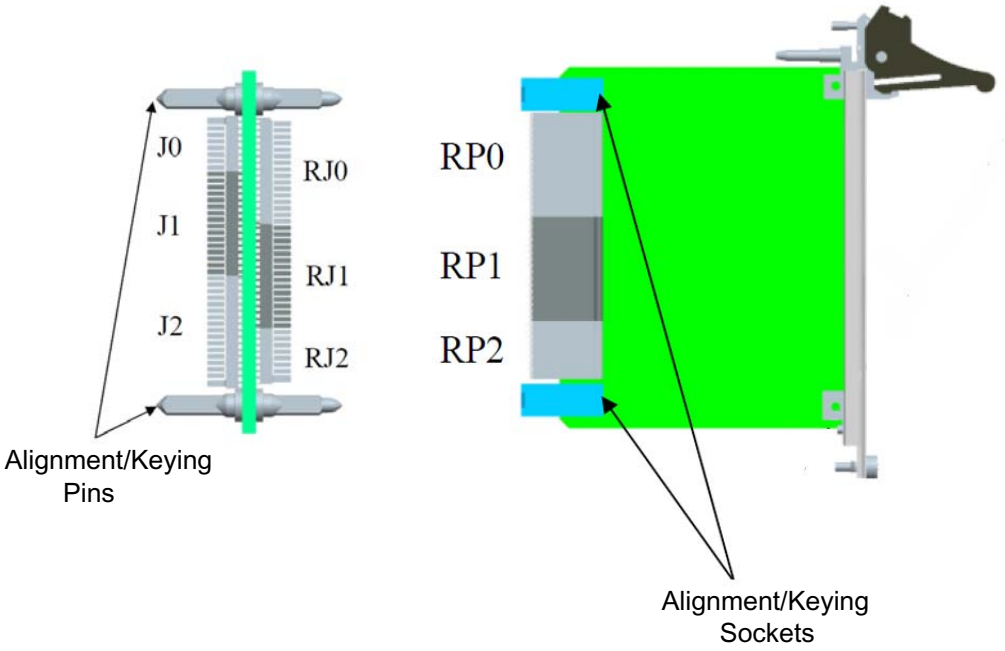


Figure 10: Connector Identification for PB-VX3-4xx

3.4 Initial Installation Procedure

The following procedures are applicable only for the initial installation of the PB-VX3-4xx in a system. Procedures for standard removal operations are found in their respective chapters.

To perform an initial installation of the PB-VX3-4xx in a system proceed as follows:

1. Ensure that the safety requirements indicated in Section 3.1 are observed.

Failure to comply with the instruction below may cause damage to the board or result in improper system operation.

2. Ensure that the board is properly configured for operation in accordance with application requirements before installing.

Care must be taken when applying the procedures below to ensure that neither the PB-VX3-4xx nor other system boards are physically damaged by the application of these procedures.

3. To install the PB-VX3-4xx perform the following:
    1. Ensure that no power is applied to the system before proceeding.

When performing the next step, DO NOT push the board into the backplane connectors. Use the ejector handles to seat the board into the backplane connectors.

    2. Carefully insert the board into the slot designated by the application requirements for the board until it makes contact with the backplane connectors.
    3. Using the ejector handle, engage the board with the backplane. When the ejector handle is locked, the board is engaged.
    4. Fasten the front panel retaining screws.
    5. Connect all external interfacing cables to the board as required.
    6. Ensure that the board and all required interfacing cables are properly secured.

The PB-VX3-4xx is now ready for operation. For operation of the PB-VX3-4xx, refer to appropriate VX3XXX SBC specific software, application, and system documentation.

3.5 Standard Removal Procedure

To remove the board proceed as follows:

1. Ensure that the safety requirements indicated in Section 3.1 are observed.

Care must be taken when applying the procedures below to ensure that neither the PB-VX3-4xx nor system boards are physically damaged by the application of these procedures.

2. Ensure that no power is applied to the system before proceeding.
3. Disconnect any interfacing cables that may be connected to the board.
4. Unscrew the front panel retaining screws.
5. Disengage the board from the backplane by first unlocking the board ejection handles and then by pressing the handles as required until the board is disengaged.
6. After disengaging the board from the backplane, pull the board out of the slot.
7. Dispose of the board as required.

Chapter 4 - Physical I/O

4.1 Front Panel Connectors

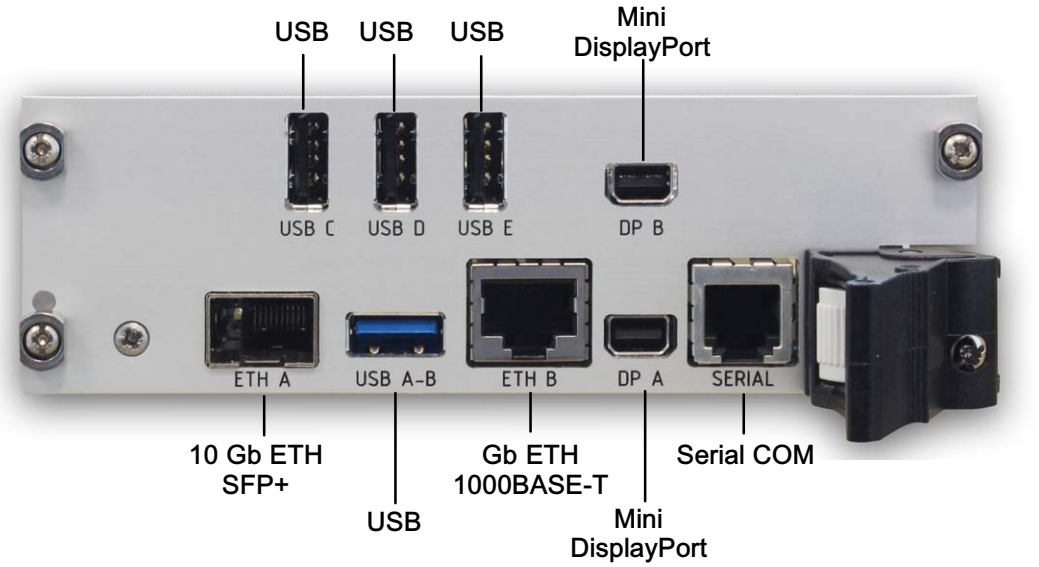


Figure 11: Location of the Front Panel Connectors

4.1.1 ETH A: 10 Gb Ethernet SFP+ Cage

The 10 Gb Ethernet connectors are available as SFP+ cage. The interfaces provide automatic detection and could switch between 1 Gbits/s or 10 Gbits/s data transmission (autonegotiation).

» Pin assignment:

PIN	SIGNAL	FUNCTION
1	VeeT	Transmitter Ground
2	Tx_Fault	Transmitter Fault Indication
3	Tx_Disable	Transmitter Disable
4	SDA	2-Wire Serial Interface Sata Line
5	SCL	2-Wire Serial Interface Clock
6	Mod_ABS	Module Absent
7	RSO	Select between full or reduced receiver bandwidth
8	Rx_LOS	Receiver Loss of Signal
9	RS1	Rate Select 1
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Receiver inverted Data output
13	RD+	Receiver non-inverted Data output
14	VeeR	Receiver Ground
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	VeeT	Transmitter Ground
18	TD+	Transmitter non-inverted Data input
19	TD-	Transmitter inverted Date input
20	VeeT	Transmitter Ground

Table 9: 10 Gb Ethernet Pin Assignment

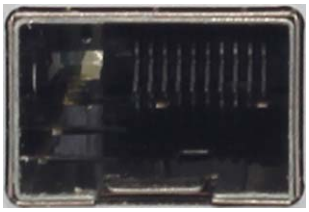


Figure 12: 10 Gb Ethernet Connector

4.1.2 USB A-B

The USB A-B connector is USB 3.0 compliant.

It can work as an USB 2.0 connector (use USB port 2, DATA2+/-), or as an USB 3.0 connector (USBSS RX/TX +/-).

» Pin Assignment:

PIN	SIGNAL	DESCRIPTION	I/O
1	+5V protected	USB power	-
2	DATA2-	Differential USB-	I/O
3	DATA2+	Differential USB+	I/O
4	GND	Ground	-
5	USBSS_RX-	Differential USB Receive -	I
6	USBSS_RX+	Differential USB Receive +	I
7	GND	Ground	-
8	USBSS_TX	Differential USB Transmit -	O
9	USBSS_TX+	Differential USB Transmit +	O

Table 10: USB A-B Pin Assignment

Figure 13: USB A-B Connector

The USB host interfaces on the PB-VX3-4xx can be used with maximum 500 mA continuous load current as specified in the Universal Serial Bus Specification, Revision 2.0. Short-circuit protection is provided. All the signal lines are EMI-filtered.

For USB 2.0 it is strongly recommended to use a cable length not exceeding 3 meters.

4.1.3 ETH B: RJ-45 1000BASE-T Ethernet Connector

The Ethernet transmission should operate using a CAT5 cable with a maximum length of 100 m.

The Ethernet connectors are available as RJ-45 connectors with tab down. The interfaces provide automatic detection and switching between 10BASE-T, 100BASE-TX and 1000BASE-T data transmission (Auto-Negotiation). Auto-wire switching for crossed cables is also supported (Auto-MDI/X).

Pin Assignment

PIN	10BASE-T		100BASE-TX		1000BASE-T	
	I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL
1	O	TX+	O	TX+	I/O	BI_DA+
2	O	TX-	O	TX-	I/O	BI_DA-
3	I	RX+	I	RX+	I/O	BI_DB+
4	-	-	-		I/O	BI_DC+
5	-	-	-		I/O	BI_DC-
6	I	RX-	I	RX-	I/O	BI_DB-
7	-	-	-		I/O	BI_DD+
8	-	-	-		I/O	BI_DD-
Shell	Chassis Ground					

Table 11: Gigabit Ethernet Connectors Pin Assignment

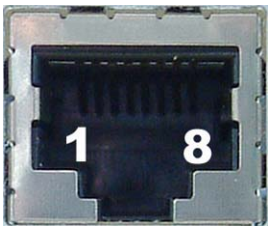


Figure 14: Ethernet Connector

4.1.4 Mini DisplayPort

PIN	SIGNAL	FUNCTION
1	GND	Ground
2	HPD	Hot Plug Detect
3	Lane0+	Lane 0 Positive
4	Config1	Config1, pulled low by PB-VX3-4xx
5	Lane0-	Lane 0 negative
6	Config2	Config2, pulled low by PB-VX3-4xx
7	GND	Ground
8	GND	Ground
9	Lane1+	Lane 1 positive
10	Lane3+	Lane 3 positive
11	Lane1-	Lane 1 negative
12	Lane3-	Lane 3 negative
13	GND	Ground
14	GND	Ground
15	Lane2+	Lane 2 positive
16	Aux+	Auxilliary+
17	Lane2-	Lane 2 negative
18	Aux-	Auxilliary-
19	GND	Ground
20	PWR	Power (3.3V, 500 mA max)

Table 12: Mini DisplayPort Pin Assignment

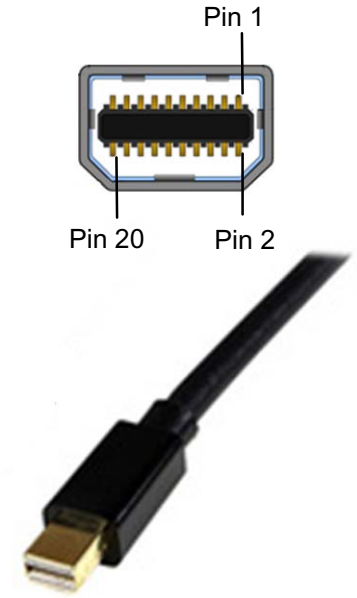


Figure 15: MinI DisplayPort Cable

4.1.5 Serial Connector - COM

The PB-VX3-4xx integrates two serial communication ports, COM1 and COM2 in PC parlance. COM1 and COM2 can operate simutanously in EIA-232 mode only (simplified RX/TX).

- COM1: EIA-232/485 (simplified RX/TX) port on RJ-12 front panel connector or on the rear P2 connector.
- COM2: EIA-232/485 (simplified RX/TX) port on the RJ-12 front panel.

Pin Assignment

PIN	SIGNAL	DESCRIPTION
1	RTS/TXD+	COM2 EIA-232 Transmit DATA
2	Shell	Chassis ground
3	TXD/TXD-	COM1 EIA-232 Transmit DATA
4	RXD/RXD-	COM1 EIA-232 Receive DATA
5	GND	Ground
6	CTS/RXD+	COM2 EIA-232 Receive DATA

Table 13: Serial Connector Pin Assignment

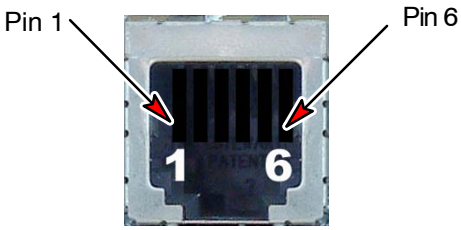


Figure 16: Serial Connector

Serial Cable Designation

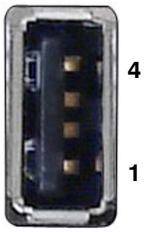
Kontron provides a specific connection kit order code: KIT-2X-RJ12DB9. It includes one RJ-12 cable and two DB9 female adapters.

4.1.6 USB Connector

Pin Assignment

PIN	SIGNAL	FUNCTION	I/O
1	VCC (+5V Protected)	VCC	--
2	USB_D-	Differential USB-	I/O
3	USB_D+	Differential USB+	I/O
4	GND	GND	--

Table 14: USB Connector Pin Assignment



USB

Figure 17: USB Connector

There are three USB 2.0 ports available on the PB-VX3-4xx, each with a maximum transfer rate of 480 Mb/s provided for connecting USB devices.

The USB host interfaces on the PB-VX3-4xx can be used with maximum 500 mA continuous load current as specified in the Universal Serial Bus Specification, Revision 2.0. Short-circuit protection is provided. All the signal lines are EMI-filtered.

The Rear I/O interface supports the USB 1.1 and USB 2.0 standards. For USB 2.0 it is strongly recommended to use a cable length not exceeding 3 meters.

4.1.7 GPIO Connector

Routed from RP0 and RP1 to GPIO onboard connector (right angle HE10 10-pin connector male).

PIN	SIGNAL	DESCRIPTION
1	GPIO1	General Purpose IO 1
2	GND	Ground
3	MRST /GPIO2	General Purpose IO 2
4	GND	Ground
5	GPIO3/SFI SCL	Optional
6	GND	Ground
7	GPIO4/SFI SDA	Optional
8	GND	Ground
9	GPIO5/TCK	General Purpose IO 5
10	GND	Ground

Table 15: Onboard GPIO Connector Pinout

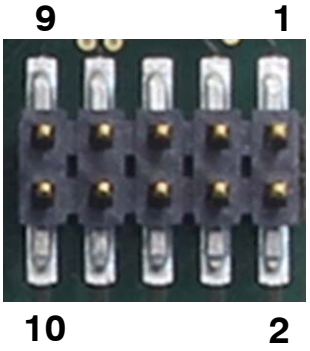


Figure 18: Onboard GPIO Connector

4.1.8 I2C System Management Connector

Routed from RP0 to I2C connector.

PIN	SIGNAL	DESCRIPTION
1	SMB_CLK	SM Bus Serial Clock (from G4 of RP0)
2	GND	Ground
3	SMB_DAT	SM Bus bi-directionnal Serial Data (from F4 of RP0)
4	3V3	+3.3V power supply
5	GND	Ground

Table 16: Onboard I2C Connector Pinout

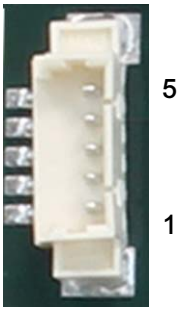


Figure 19: Onboard I2C Connector

4.1.9 Serial ATA Interfaces

The onboard Serial ATA connectors allow the connection of standard HDDs and other Serial ATA devices to the PB-VX3-4xx.

The following figure and table provide pinout information for the SATA connectors.

SATA Port Number	PIN	SIGNAL	DESCRIPTION	I/O
Port 0	1	GND	Ground signal	--
	2	SATA0_TX+	Differential Transmit +	O
	3	SATA0_TX-	Differential Transmit -	O
	4	GND	Ground signal	--
	5	SATA0_RX-	Differential Receive -	I
	6	SATA0_RX+	Differential Receive +	I
	7	GND	Groudn Signal	--
Port 1	1	GND	Ground signal	--
	2	SATA1_TX+	Differential Transmit +	O
	3	SATA1_TX-	Differential Transmit -	O
	4	GND	Ground signal	--
	5	SATA1_RX-	Differential Receive -	I
	6	SATA1_RX+	Differential Receive +	I
	7	GND	Groudn Signal	--
Port 2	1	GND	Ground signal	--
	2	SATA2_TX+	Differential Transmit +	O
	3	SATA2_TX-	Differential Transmit -	O
	4	GND	Ground signal	--
	5	SATA2_RX-	Differential Receive -	I
	6	SATA2_RX+	Differential Receive +	I
	7	GND	Groudn Signal	--
Port 3	1	GND	Ground signal	--
	2	SATA3_TX+	Differential Transmit +	O
	3	SATA3_TX-	Differential Transmit -	O
	4	GND	Ground signal	--
	5	SATA3_RX-	Differential Receive -	I
	6	SATA3_RX+	Differential Receive +	I
	7	GND	Groudn Signal	--

Table 17: Onboard SATA Connectors Pinout

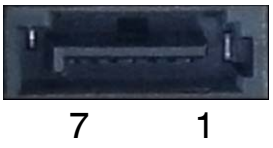


Figure 20: Onboard SATA Connectors

When using a Serial ATA cable, it is recommended to use a special right-angled Serial ATA cable due to possible space limitations within the system.

However, when using the PB-VX3-41x paddle boards, a vertical Serial ATA cable is preferred for the first layer due to the presence of the second layer module.

For more information about routing signals, refer to 4.2 - Rear I/O Interfaces

4.2 Rear I/O Interfaces

The PB-VX3-4xx Rear Transition Module conducts a wide range of I/O signals through the rear I/O connectors RP0, RP1 and RP2.

- RP0: one 15-wafer 7-row connector
- RP1: one 16-wafer 7-row connector
- RP2: one 8-wafer 7-row connector

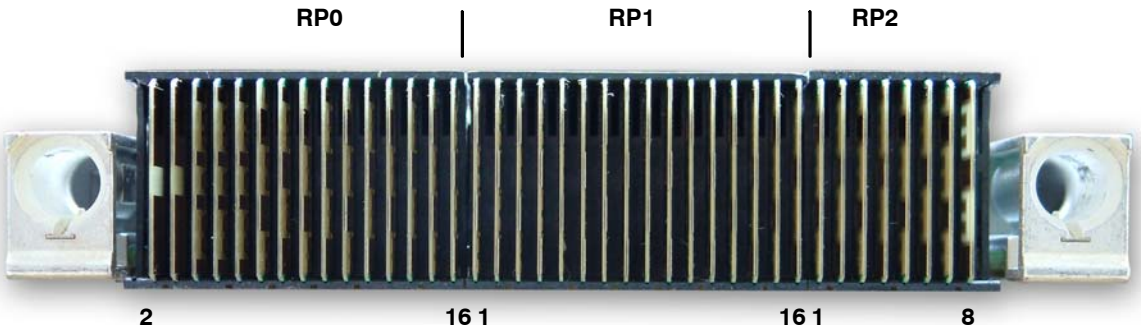


Figure 21: Rear I/O VPX Connectors

4.2.1 RP0 Connector

RP0 Wafer Assignment

Wafer	Row G	Row F	Row E	Row D	Row C	Row B	Row A	Board Wafer
1	No Wafer							P0 W1
2	+12V	+12V	+12V	NC	NC (Optional 12V)	NC (Optional 12V)	NC (Optional 12V)	P0 W2
3	+5V	+5V	+5V	GND	+5V	+5V	+5V	P0 W3
4	SMB1 CLK	SMB1 DAT	GND	NC (-12V_AUX)	GND	SYSRESET*	NC (NVMRO)	P0 W4
5	NC (GAP*)	NC (GA4*)	GND	NC (3V3_AUX)	GND	SMB0 CLK	SMB0 DAT	P0 W5
6	NC (GA3*)	NC (GA2*)	GND	NC (+12V_AUX)	GND	NC (GA1*)	NC (GA0*)	P0 W6
7	GPIO5 (TCK)	GND	NC (TDO)	NC (TDI)	GND	SFI_SCL (TMS)	SFI_SDA (TRST)	P0 W7
8	GND	NC (REF_CLK-)	NC (REF_CLK+)	GND	NC (RES_CLK-)	NC (RES_CLK+)	GND	P0 W8
9	NC (GDISCRETE1)	GND	NC	NC	GND	NC	NC	P1 W1
10	GND	NC	NC	GND	NC	NC	GND	P1 W2
11	NC (VBAT)	GND	NC	NC	GND	NC	NC	P1 W3
12	GND	NC	NC	GND	NC	NC	GND	P1 W4
13	NC (SYSCON*)	GND	NC	NC	GND	NC	NC	P1 W5
14	GND	NC	NC	GND	NC	NC	GND	P1 W6
15	NC (P1-REF_CLK_SE)	GND	NC	NC	GND	NC	NC	P1 W7
16	GND	NC	NC	GND	NC	NC	GND	P1 W8
CASE	GND							

* signal active when low

Table 18: Rear I/O VPX Connector RP0 Wafer Assignment

RP0 Signal Definition

Mnemonic	Signal Definition
+12V	+12 Volts DC power (VS1 VPX supply).
+5V	+5 Volts DC power (VS3 VPX supply)
SFI_SCL	Ethernet 10G I2C clock for SFP+
SFI_SDA	Ethernet 10G I2C data for SFP+
SMB0	System Management Bus 0
SMB1	System Management Bus 1
SYSRESET*	System Reset. Input and open collector output.
GPIOx	General Purpose IO x

Table 19: Rear I/O VPX Connector RP0 Signal Definition

4.2.2 RP1 Connector

RP1 Wafer Assignment

> Legend for Table 20

COM1	Simplified serial line	USBSS	USB 3.0 link
eDP-A/B	Digital port x	ETH_DA/DB/DC/DD	1000BASE-T Ethernet link
SATA0/1/2/3	Sata links port x	SERD	Serdes link
USB2/3/4/5	USB 2.0 links		

RTM Wafer	ROW G	ROW F	ROW E	ROW D	ROW C	ROW B	ROW A	Board Wafer
1	USB2 PWR	GND	SATA0 TX-	SATA0 TX+	GND	SATA0 RX-	SATA0 RX+	P1 W9
2	GND	SATA3 TX-	SATA3 TX+	GND	SATA3 RX-	SATA3 RX+	GND	P1 W10
3	USB3 PWR	GND	USBSS TX-	USBSS TX+	GND	USBSS RX-	USBSS RX+	P1 W11
4	GND	USB2 DA-	USB2 DA+	GND	USB3 DA-	USB3 DA+	GND	P1 W12
5	GPIO1	GND	ETH DB-	ETH DB+	GND	ETH DA-	ETH DA+	P1 W13
6	GND	ETH DD-	ETH DD+	GND	ETH DC-	ETH DC+	GND	P1 W14
7	Maskable Reset* or GPIO2	GND	SERD1 TX-	SERD1 TX+	GND	SERD1 RX-	SERD1 RX+	P1 W15
8	GND	SERD0 TX-	SERD0 TX+	GND	SERD0 RX-	SERD0 RX+	GND	P1 W16
9	COM1_RTS or COM1 TXD+	GND	SATA1 TX-	SATA1 TX+	GND	SATA1 RX-	SATA1 RX+	P2 W1
10	GND	SATA2 TX-	SATA2 TX+	GND	SATA2 RX-	SATA2 RX+	GND	P2 W2
11	COM1 TXD	GND	USB4 PWR	USB4 PWR	GND	USB5 PWR	USB5 PWR	P2 W3
12	GND	USB4 DA-	USB4 DA+	GND	USB5 DA-	USB5 DA+	GND	P2 W4
13	COM1 CTS or COM1 RXD+	GND	eDP-A 1-	eDP-A 1+	GND	eDP-A 0-	eDP-A 0+	P2 W5
14	GND	eDP-A 3-	eDP-A 3+	GND	eDP-A 2-	eDP-A 2+	GND	P2 W6
15	COM1 RXD	GND	eDP-B HPD	eDP-A HPD	GND	eDP-A AUX-	eDP-A AUX+	P2 W7
16	GND	eDP-B 1-	eDP-B 1+	GND	eDP-B 0-	eDP-B 0+	GND	P2 W8
CASE	GND							

Table 20: Rear I/O VPX Connector RP1 Wafer Assignment

RP1 Signal Definition

Mnemonic	Signal Definition
eDP-B_x+/-	Embedded DisplayPort B
eDP-A_x+/-	Embedded DisplayPort A
eDP-x_HPD	Embedded DisplayPort x Hot Plug Detect
COMx	Serial line, EIA-232
USBx_PWR	USB Power link x
USBx_DA +/-	Differential Data pair of USB link x
USBSS_TX +/-	USB SuperSpeed Transmit link (USB 3.0)
USBSS_RX +/-	USB SuperSpeed Receive link (USB 3.0)
SATAx RX+/-	Serial ATA. Receive +/- link port x
SATAx TX+/-	Serial ATA. Transmit +/- link port x
SERD0_TX +/-	Not Connected
SERD0_RX +/-	Not Connected
SERD1_TX +/-	10 G Base KR transmit link
SERD1_RX +/-	10 G Base KR receive link
ETH_DA +/-	Ethernet 1000BASE-T: First pair of transmit/receive data
ETH_DB +/-	Ethernet 1000BASE-T: Second pair of transmit/receive data
ETH_DC +/-	Ethernet 1000BASE-T: Third pair of transmit/receive data
ETH_DD +/-	Ethernet 1000BASE-T: Fourth pair of transmit/receive data
GPIOx	General Purpose IO x
Maskable Reset	Optional reset input
Reserved	Reserved, do not connect

Table 21: Rear I/O VPX Connector RP1 Signal Definition

4.2.3 RP2 Connector

➢ Legend for Table 22

COM2	Simplified Serial Lines
eDP-B	Digital port B from PCH

RP2 Wafer Assignment

RTM Wafer	Row G	Row F	Row E	Row D	Row C	Row B	Row A	Board Wafer
1	COM2 TXD+	GND	eDP-B 3-	eDP-B 3+	GND	eDP-B2-	eDP-B 2+	P2 W9
2	GND	Reserved	Reserved	GND	eDP-B AUX-	eDP-B AUX+	GND	P2 W10
3	COM2 TXD	GND	Reserved	Reserved	GND	Reserved	Reserved	P2 W11
4	GND	Reserved	Reserved	GND	Reserved	Reserved	GND	P2 W12
5	COM2 RXD+	GND	Reserved	Reserved	GND	Reserved	Reserved	P2 W13
6	GND	Reserved	Reserved	GND	Reserved	Reserved	GND	P2 W14
7	COM2 RXD	GND	Reserved	Reserved	GND	Reserved	Reserved	P2 W15
8	GND	Reserved	Reserved	GND	Reserved	Reserved	GND	P2 W16
CASE	GND							

Table 22: Rear I/O VPX Connector RP2 Wafer Assignment

RP2 Signal Definition

Mnemonic	Signal Definition
COMx	Serial Lines, EIA-232
eDP-B_x+/-	embedded DisplayPort B
GND	Ground
Reserved	Reserved, do not connect

Table 23: Rear I/O VPX Connector RP2 Signal Definition

4.3 SLM Connector

Connector pin assignment

Pin	Signal	Signal	Pin
1	GND	GND	2
3	+5V	NC	4
5	+5V	NC	6
7	+5V	NC	8
9	+5V	GND	10
11	GND	USB3_DA-	12
13	USB4_DA-	USB3_DA+	14
15	USB4_DA+	Gnd	16
17	GND	SATA1 RX-	18
19	SATA1 TX+	SATA1 RX+	20
21	SATA1 TX-	GND	22
23	GND	SATA2 RX-	24
25	SATA2 TX+	SATA2 RX+	26
27	SATA2 TX-	GND	28
29	Gnd	USB3_PWR	30
31	USB5_DA-	USB3_PWR	32
33	USB5_DA+	USB4_PWR	34
35	GND	USB4_PWR	36
37	+12V	USB5_PWR	38
39	GND	USB5_PWR	40
41	+3.3V SB	GND	42
43	GND	eDP-B_AUX+	44
45	eDP-B_HPD	eDP-B_AUX-	46
47	GND	GND	48
49	eDP-B_0+	eDP-B_1+	50
51	eDP-B_0-	eDP-B_1-	52
53	GND	GND	54
55	eDP-B_2+	eDP-B_3+	56
57	eDP-B_2-	eDP-B_3-	58
59	GND	GND	60

Table 24: SLM Connector Pin Assignment

Signal Description

Mnemonic	Signal Definition
eDP-B_x+/-	Embedded DisplayPort B
eDP-B_HPD	Embedded DisplayPort B Hot Plug Detect
SATAx RX+/-	Serial ATA. Receive +/- link port x
SATAx TX+/-	Serial ATA. Transmit +/- link port x
USBx_PWR	USB Power link x
USBx_DA +/-	Differential Data pair of USB link x
GND	Ground
+12V	+12 Volts DC power (VS1 VPX supply)
+5V	+5 Volts DC power (VS3 VPX supply)
+3.3V_SB	+3.3 Volts Standby power (3V3 auxiliary VPX power supply) - Not Connected

Table 25: SLM Connector Signal Definition

MAILING ADDRESS
Kontron Modular Computers S.A.S.
150 rue Marcelin Berthelot - BP 244
ZI TOULON EST
83078 TOULON CEDEX - France

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