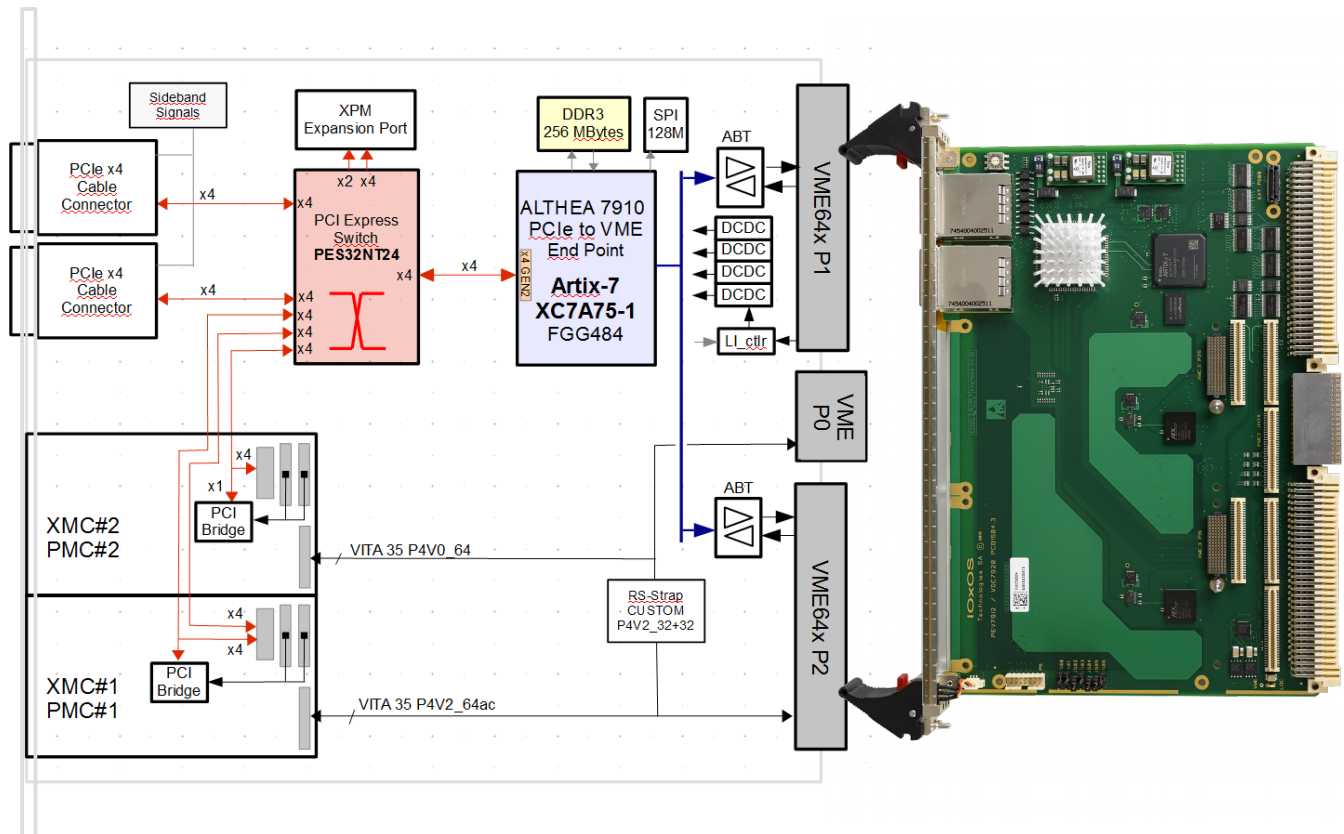# PEV_7912 PCI Express to VME64x Bridge
VME64x Advanced I/O Interface

Data Sheet

Key Features

- 6U VME64x PCI Express to VME transparent bridge with enhanced expansion capabilities
- ALTHEA 7910 FPGA based PCI Express to VME64x transparent bridge:
    - Implemented in Xilinx Artix-7 device
    - VME64x Master/Slave interface with Slot-1 functions
    - True PCI Express End Point x4 GEN1/GEN2
    - Supports VME Data D08, D16, D32, BLT32, MBLT64, 2eVME, 2eSST and 2eSST Broadcast
    - High-performance DMA
- 256 MBytes DDR3 Shared Memory
- VITA 35 compliance (PMC/XMC Jn14/Jn24 mapping to VME P2): P4V0-64, P4V2-64ac
- VME P0 extension, VITA 35 compliant
- Enhanced I/O expansion capabilities
    - Two front panel PCI Express x4 cable connections supporting copper and fiber
    - Optional XPM_1262 module to control two additional XMC/PMC slots (PCIe GEN2 link)
- PCIe GEN2 24-port switch PES32NT24
    - Eight NTB ports
    - Embedded DMA Controller
- Thermal and Power supplies monitoring
- Linux, VxWorks® and Microsoft® Windows 7 Software Suite ALTHEA 7910

Overview

IOxOS Technologies releases the PEV_7912, its second generation of 6U VME64x PCI Express to VME bridge boards, targeting high performance computing, I/O control and test applications in Mil/Aero, Transport and High Energy Physics (HEP) fields.

The PEV_7912 aims to enhance existing VME64 data acquisition, control and test systems by removing the computing node from the crate and preserving most of the valuable I/O modules. This approach, confirmed by its predecessor (PEV_1100) allows to adapt specific real time systems to work with widely available high-end multi-core servers running standard operating systems.

This solution minimizes the obsolescence risks inherent to expensive embedded processors driven by proprietary operating systems.

The PEV_7912 forms part of the new line of IOxOS Technologies VME64x products featuring its proprietary ALTHEA 7910 solution, a PCI Express to VME64x Bridge implemented in a Xilinx Artix-7 FPGA to deliver an extremely competitive COTS in terms of cost, performance and power consumption. This field proven solution natively supports all Master/Slave VME64x modes of operation with Slot_1 System Controller function, including VME64x data transport 2eVME and 2eSST modes with maximal burst length capability, while guaranteeing very long term availability of the board as a result of not depending on already obsolete third party VME interfaces.

A true VME Renaissance.

Introduction

The PEV_7912 is a 6U VME64x PCI Express to VME bridge board with enhanced expansion capabilities and fully compliant with the latest PCI-SIG's "PCI Express External Cabling Specification", allowing to extend its onboard PCI Express bus infrastructure and to break trough the VME crate boundaries with both copper and optical fiber standard cables.

The board features the following major improvements over its successful predecessor, the PEV_1100:

- FPGA based PCI Express to VME64x transparent bridge implemented in Xilinx Artix-7 device
- True PCI Express End Point (EP) x4 GEN1/GEN2
- VME crate chaining through PCI Express cable connections
- Expansion port to double the number of PMC/XMC slots through a PCI Express GEN2 link
- VITA 35 compliance through user configurable static I/O selector (small 0 Ω resistor networks)
- Lower power consumption
- Much long term availability

ALTHEA 7910 FPGA based VME64x Interface

The VME64x interface is implemented using IOxOS Technologies proprietary ALTHEA 7910 solution, a Xilinx Artix-7 based PCI Express to VME64x Bridge. Since 2014, this interface is marketed and used by relevant VME manufacturers worldwide to replace the obsolete TSI148 VME interface.

The PCI Express to VME64x interface includes new features such as:

- Embedded SRAM Shared Memory SMEM 64K/128K
- Direct IDMA PCIe-VME64x without intermediate copy in SMEM
- Message Passing FIFO and Semaphores
- VME A24, A16 Slave windows mapping
- Integration of TSI148 specific functions

PMC/XMC Jn14/Jn24 Mapping to VME P2

The connection between the PMC/XMC Jn14 and Jn24 I/Os and VME P2 is done through a user configurable static I/O selector that is implemented with several small SMD 0 Ω resistor networks in order to ensure compliance with VITA 35 standard.

Following connection configurations are supported:
- P4V2-64ac: 64 Jn14 I/Os mapped to VME P2 rows a and c
- P4V0-64: 64 Jn24 I/Os mapped to VME P0

Enhanced Expansion Capabilities

The PEV_7912 features two PCI Express by cable connectors in its front panel, allowing single (SR-IOV) and multi-root (MR-IOV) I/O virtualization (I/O physically separated from computing node but still belonging to its addressing domain) and also enabling VME crate to crate connection. Both copper and optical fiber standard cables are supported.

The board also implements an expansion port to increase the number of PMC/XMC slots from two up to four, by attaching the XPM_1262 expansion module.

The XPM_1262 is connected to the PEV_7912 PCI Express infrastructure with a high speed coax flat cable, SAMTEC HLCD, that fulfills the PCI Express GEN2 performance requirements.

Built-In Health Monitor

The PEV_7912 provides health status of the board by monitoring temperature (ambient and junction) with its built-in XADC System Monitor hard macro, and by monitoring power supply parameters through dedicated PMBus.

Software Support

The PEV_7912 suports Linux (x86/x64 & PowerPC) VxWorks® 7 (x64) Microsoft® Window 7 (X86/x64) and uses ALTHEA 7910 Software Suite containing:
- AltMon Command Interpreter
- User API, Device Drivers and Examples

Environmental Specifications

Estimated Power (PMC/XMC not plugged)	+5V → 6[A] (VITA 1.7 max 7.5[A]) +3.3V locally generated from +5V ±12V not used onboard
Compliance	VME64x VITA 1.1 + VITA 1.5-2003 XMC VITA 42.3 / VITA 35 : • P4V2-64ac • P4V0-64
Operating Temperature	Commercial: 0ºC to +55ºC 400 LFM Industrial: -40ºC to +55ºC 400 LFM
Regulatory Compliance	Immunity: EN50082-2 / EN55024 Emission: EN55022 Class A Safety: EN60950

Ordering Information

Article Reference	Product Description
PEV_7912-A0	PCIe to VME64x Bridge, commercial temp. grade VME connectors: P0 and 5-row P1, P2
PEV_7912-B0	PCIe to VME64x Bridge, industrial temp. grade VME connectors: P0 and 5-row P1, P2
PEV_7912-C0	PCIe to VME64x Bridge, commercial temp. grade VME connectors: 5-row P1, P2 (P0 is not mounted)
PEV_7912-D0	PCIe to VME64x Bridge, industrial temp. grade VME connectors: 5-row P1, P2 (P0 is not mounted)
PEA_3100-A0	PCIe x4 PC Host Adapter, commercial temp. grade
PEA_3100-B0	PCIe x4 PC Host Adapter, industrial temp. grade
KIT-PEV7912-M	Interconnection set including the PEV_7912, the PEA_3100 PC Host Adapter and a PCIe x4 cable Contact IOxOS Technologies to configure the different options (temperature grade, cable length)

4, chemin de Fontenailles
1196 Gland
SWITZERLAND
tel: +41 (0)22 364 76 90

Email: info@ioxos.ch