PCI516

PCIe FPGA Carrier for FMC, Virtex-7

PCI516

Key Features

- PCIe FPGA carrier for FMC per VITA 57
- Xilinx Virtex-7 690T FPGA
- Active cooling for FPGA and FMC
- Supported by DAQ Series™ data acquisition software
- Dual x8 lanes for direct connection to neighbouring FPGA card(s)
- Dual bank of 64-bit DDR3 memory 4 GB Total
- Single bank of 32-bit DDR3 memory 1 GB

Benefits

- Based on the widely-used VadaTech AMC516
- Strong BSP support and example code to support system bring-up
- Wide range of compatible FMCs, including ADC, DAC and networking
- Electrical, mechanical, software, and system-level expertise in house
- Full system supply from industry leader
- AS9100 and ISO9001 certified company

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The PCI516 is based on the Xilinx Virtex-7 690T, which provides 3,600 DSP slices, 52,920 Kb RAM and 690,000 logic cells. The FPGA interfaces directly to the FMC DP 0-9 and all FMC LA/HA/HB pairs, making it compatible with a wide range of industry standard VITA 57 modules. It also has interface to three DDR3 memory channels (64-bit wide and 16-bit wide). This allows for large buffer sizes to be stored during processing as well as for queuing the data to the host.

The unit has x8 PCIe edge connector routed to the FPGA PCIe Gen3 hard IP block. In addition, 16 uncommitted connection pairs are routed to a dual x8 expansion connector, providing direct connectivity to a neighbouring FPGA (e.g. via Aurora, 10 G/40 G, SRIO, PCIe) without the need to go through the host.

The PCI516 provides active cooling of the FPGA and FMC, making it appropriate for power-hungry applications or those requiring temperature stability for good performance.

Figure 1: PCI516

Block Diagram

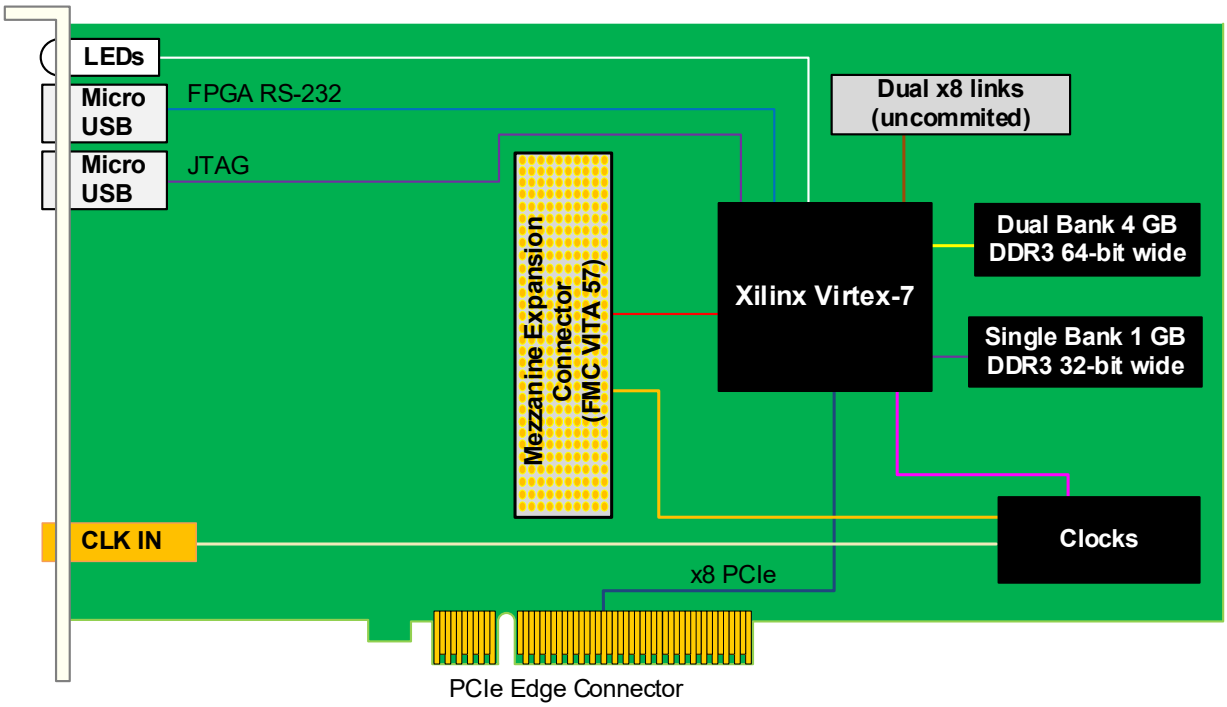

Figure 2: PCI516 Functional Block Diagram

Front Panel

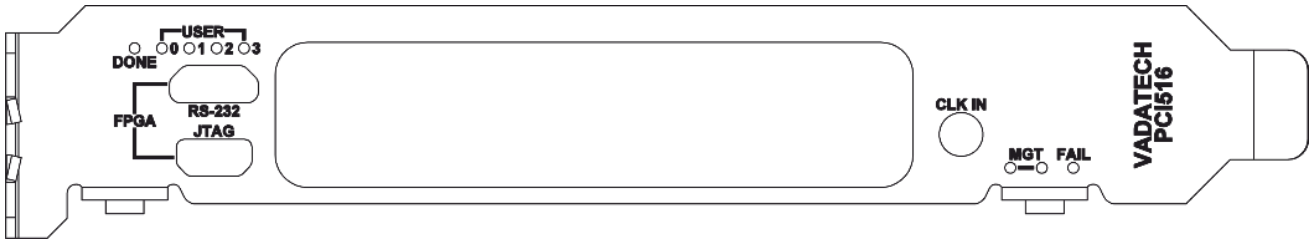

Figure 3: PCI516 Rear Panel

Data Acquisition

VadaTech offers a wide range of FPGA AMCs, RTMs, FMC Carriers and FMCs that can be combined to build a Data Acquisition (DAQ) sub-system. The DAQ Series software, when used with a supported hardware configuration, provides all that is needed to configure the system, acquire data and transfer it to a host processor. It also includes a user-configurable Graphical User Interface (Figure 4), which incorporates real-time display of acquired data. The host can be within the MTCA system or, via PCI113 or PCI123, in a separate PC. Full documentation is provided to allow users to customize system behavior or develop their own application on the AMC/FMC hardware.

The DAQ includes data acquisition software that allows users to get up and running quickly and easily, while providing a high level of performance and allowing the user to extend functionality by adding their own FPGA code. Please contact VadaTech sales for the latest information on supported combinations of VadaTech hardware. (Note that the DAQ Series software is not currently supported for 3rd party hardware).

Components provided in the DAQ software include:

- System libraries to configure clocking and triggers
- Sequencer to configure the acquisition (duration, start, stop)
- High-performance DMA firmware for acquiring ADC outputs and transferring to host processor
- Linux driver for host processor (e.g. AMC72x)
- EPICS channel access client API
- Pre-configured GUI (based on Qt Creator)

This software set allows the user to acquire, transfer and display data without the need for any user programming of the hardware. Status information is included in the GUI display, to ease integration and debugging activity.

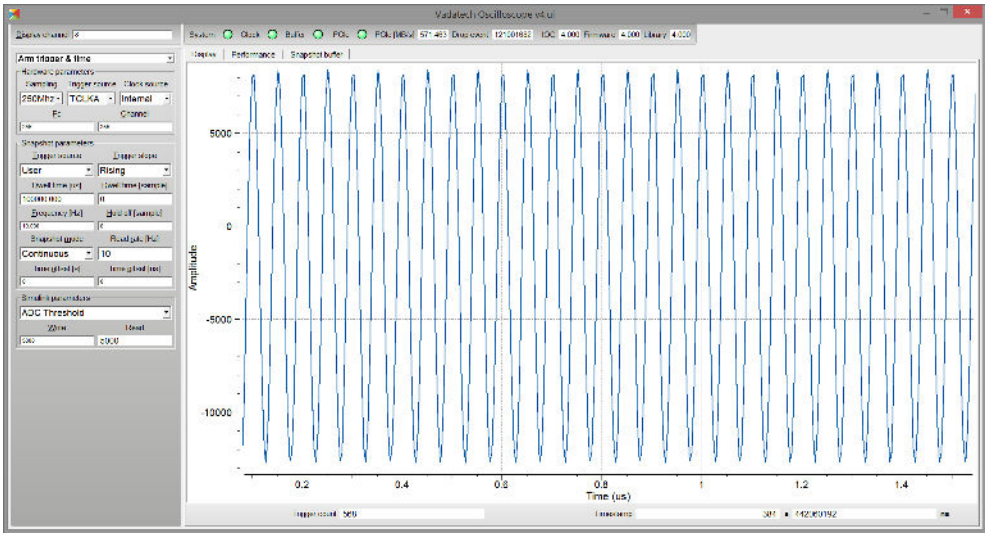

Figure 4: Typical Graphic User Interface Display

The data acquisition software provided as part of the DAQ can be used as-delivered without the user needing to develop any FPGA code.

Full source code is provided for the libraries, sequencer, DMA, Linux driver and GUI, allowing users to easily customize or brand to their own requirements at the exception of a low level PCIe IP from Xilinx provided only as Netlist (this low-level block doesn't require modification/customization from integrators or end-users).

Reference Design

VadaTech provides an extensive range of Xilinx based FPGA products. The FPGA products are in two categories; FPGA boards with FMC carriers and FPGA products with high speed ADC and DACs. The FPGA products are designed in various architectures such as AMC modules, PCIe cards and Open VPX.

VadaTech provides a reference design implementation for our FPGAs complete with VHDL source code, documentation and configuration binaries. The reference design focuses on the I/O ring of the FPGA to demonstrate low-level operation of the interconnections between the FPGA and other circuits on the board and/or backplane. It is designed to prove out the hardware for early prototyping, engineering/factory diagnostics and customer acceptance of the hardware, but it does not strive to implement a particular end application. The reference VHDL reduces customer time to develop custom applications, as the code can be easily adapted to meet customer's application requirements.

The reference design allows you to test and validate the following functionality (where supported by the hardware):

- Base and Fabric channels
- Clocks
- Data transfers
- Memory
- User defined LEDs

Xilinx provides Vivado Design Suite for developing applications on Xilinx based FPGAs. VadaTech provides reference VHDL developed using the Vivado Design Suite for testing basic hardware functionality. The reference VHDL is provided royalty free to use and modify on VadaTech products, so can be used within applications at no additional cost. However, customers are restricted from redistributing the reference code and from use of this code for any other purpose (e.g. it should not be used on non-VadaTech hardware).

The reference VHDL is shipped in one or more files based on a number of ordering options. Not all ordering options have an impact on the FPGA and a new FPGA image is created for those options that have direct impact on the FPGA. Use the correct reference image to test your hardware. For more information, refer to the FPGA reference design manual for your device which can accessed from customer support site along with the reference images.

Supported Software

- Default FPGA image stored in flash memory
- Linux BSP
- Build Scripts
- Device Driver
- Reference application projects for other ordering options

The user may need to develop their own FPGA code or adapt VadaTech reference code to meet their application requirements. The supplied pre-compiled images may make use of hardware evaluation licenses, where necessary, instead of full licenses. This is because VadaTech does not provide licenses for the Vivado tool or Xilinx IP cores, so please contact Xilinx where these are required.

Xilinx also provides System Generator tools for developing Digital Signal Processing (DSP) applications.

See the following links:

Xilinx Vivado Design Suite, Xilinx System Generator for DSP.

Specifications

Architecture		
Physical	**Dimensions**	Single Module
		Width: 4.36” (110.74 mm)
		Depth: 12.283” (311.98 mm)
Type	**PCI Carrier**	PCI FPGA Carrier for FMC
Standards		
PCIe	**Lanes**	x8
Configuration		
Power	**PCI516**	~35W without the FMC (Application specific)
Environmental	**Temperature**	See Ordering Options
		Storage Temperature: –40° to +85°C
	Vibration	Operating 9.8 m/s^2 (1G), 5 to 500 Hz
	Shock	Operating 30Gs on each axis
	Relative Humidity	5 to 95% non-condensing
Front Panel	**Interface Connectors**	Micro HDMI for FPGA JTAG
		Micro USB for FPGA RS-232
		CLK IN from SSMC
	LEDs	Status and Activity
Software Support	**Operating System**	N/A
Other		
MTBF	MIL Hand book 217-F@ TBD hrs	
Certifications	Designed to meet FCC, CE and UL certifications, where applicable	
Standards	VadaTech is certified to both the ISO9001:2000 and AS9100B:2004 standards	
Warranty	Two (2) years, see VadaTech Terms and Conditions	

INTEGRATION SERVICES AND APPLICATION-READY PLATFORMS

VadaTech has a full ecosystem of OpenVPX, ATCA and MTCA products including chassis platforms, shelf managers, AMC modules, Switch and Payload Boards, Rear Transition Modules (RTMs), Power Modules, and more. The company also offers integration services as well as pre-configured Application-Ready Platforms. Please contact VadaTech Sales for more information.

Ordering Options

PCI516 – 000-0E0-GHJ

		G = Clock Holdover Stability
		0 = Standard (XO) 1 = Stratum-3 (TCXO)
	E = FPGA Speed	**H = Temperature Range**
	1 = Low* 2 = High 3 = Highest	0 = Commercial (–5° to +55°C) 1 = Industrial (–20° to +70°C)
		J = Conformal Coating
		0 = No coating 1 = Humiseal 1A33 Polyurethane 2 = Humiseal 1B31 Acrylic

Notes: *Options E=1 require a minimum order quantity of 20 units

For operational reasons VadaTech reserves the right to supply a higher speed FPGA device than specified on any particular order/delivery at no additional cost, unless the customer has entered into a Revision Lock agreement with respect to this product.

Related Products

AMC516

- AMC FPGA carrier for FMC per VITA 57
- Xilinx Virtex-7 690T FPGA in FFG-1761 package with optional P2040
- Supported by DAQ Series™ data acquisition software

FMC213

- FPGA Mezzanine Card (FMC) per VITA 57
- Quad ADC based on ADS42JB69: JESD204B compliant, Analog Front end bandwidth 900 MHz and 16-Bit Resolution @ 250 MSPS
- DAC based on AD9129: Single DAC 14-bit @ 5.7 GSPS and Direct RF Synthesis @ 2.8 GSPS Data Rate

FMC225

- FPGA Mezzanine Card (FMC) per VITA 57
- Front panel interface includes CLK In, Trig In, Analog In/Out, and GPIO
- On-chip delay locked loops (DLLs) optimize timing between different clock domains.

Contact

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