VPX598

Quad ADC @ 3 GSPS with Quad DAC @ 12 GSPS, Kintex UltraScale™, 3U VPX

VPX598

Key Features

- 3U FPGA Quad ADC and Quad DAC per VITA 46
- Xilinx Kintex UltraScale™ XCKU115 FPGA
- Quad ADC 14-bit @ 3 GSPS (AD9208)
- Quad DAC 16-bit @ 12 GSPS (AD9162 or AD9164)
- Two banks of 64-bit wide DDR4 for a total of 16 GB
- Health Management through dedicated Processor

Benefits

- Closely coupled ADC and DAC for low-latency response, dual channel for I/Q
- Xilinx UltraScale™ XCKU115 FPGA provides powerful compute resource
- Electrical, mechanical, software, and system-level expertise in house
- Full system supply from industry leader
- AS9100 and ISO9001 certified company

OpenVPX™

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VPX598

The VPX598 provides quad ADC sampling rates of up to 3 GSPS at a 14-bit resolution (AD9208). Also, quad DAC delivers update rates of up to 12 GSPS and incorporates direct RF synthesis capable of 6 GSPS at a 16-bit resolution (Analog Devices AD9162 or AD9164). This makes VPX598 suitable for signal capture/analysis applications such as COMINT/SIGINT, radar, research and instrumentation.

The unit has an onboard, re-configurable UltraScale UltraScale™ XCKU115 FPGA that directly interfaces with ADC/DAC and two banks of DDR4 memory channels (dual 64-bit wide for a total of 16 GB). This allows for large buffer sizes to be stored during processing as well as for queuing the data to the host.

VPX598 routes x8 high speed SERDES to the P1 configurable as PCIe/SRIO/10GbE/Aurora etc. and x8 high speed SERDES to P2 that can be configured as SRIO/10GbE/Aurora. The module has an on-board dedicated health management CPU which complies with the OpenVPX standard.

The unit is available in a range of temperature and shock/vib specifications per ANSI/VITA 47, up to v3 and OS2.

Please contact VadaTech for details of Conduction Cooled versions.

Figure 1: VPX598

Block Diagram

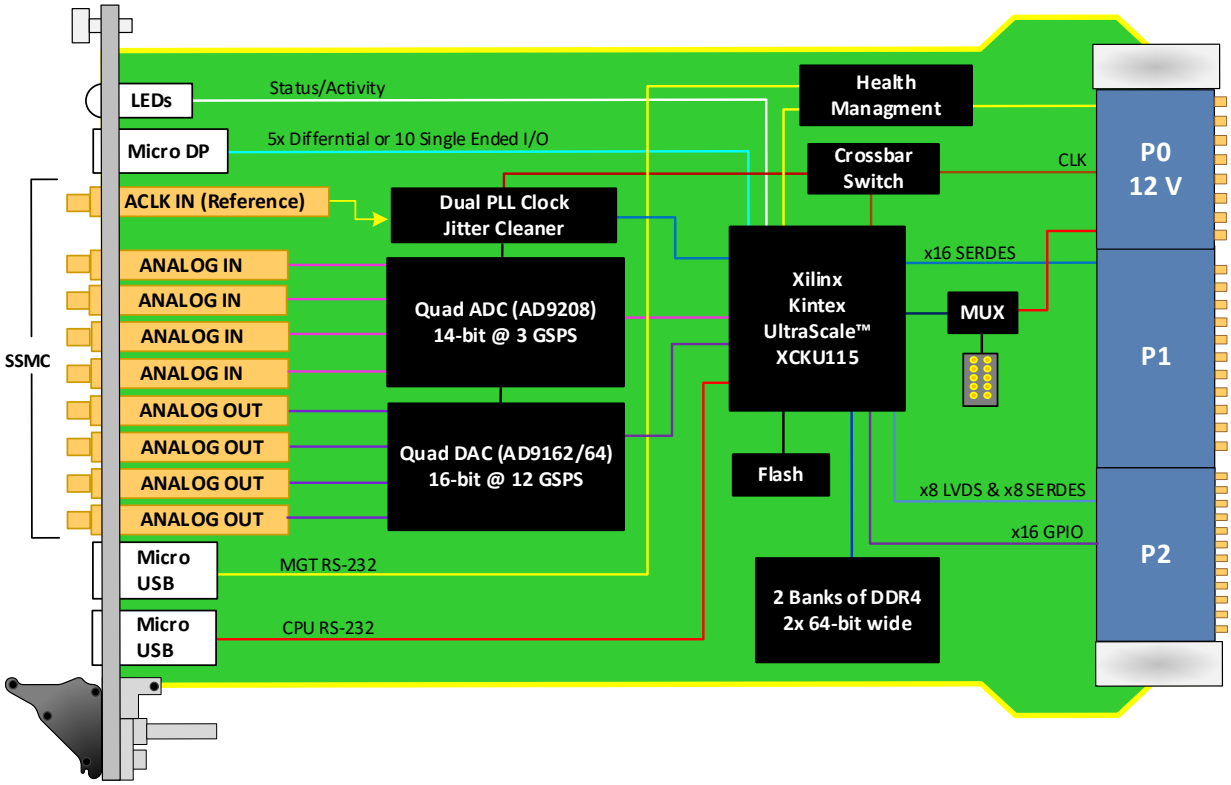

Figure 2: VPX598 Functional Block Diagram for Option A=1 (Onboard PLL)

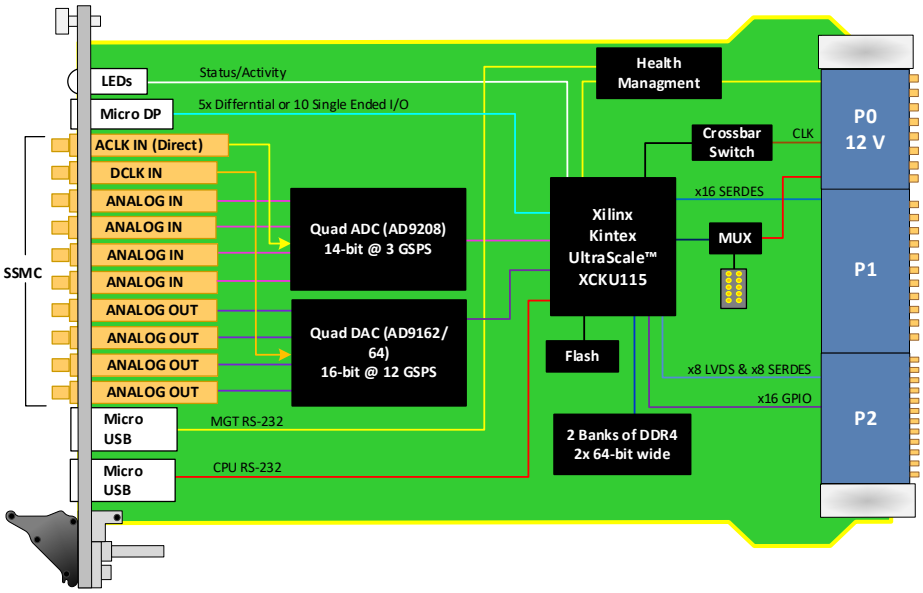

Figure 3: VPX598 Functional Block Diagram for Option A=0 (Direct RF)

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 be accessed from the 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**	3U, 2” pitch
FPGA		Xilinx Kintex UltraScale™ XCKU115
Configuration		
Power	**VPX598**	~50W (dependent on FPGA load), could be as high as 85W
Memory		Two banks of DDR4, 64-bit wide (16 GB total)
Front Panel	**SSMC**	10x for Analog In (4), Analog Out (4), Analog Clock and Digital Clock
	Micro USB	RS-232 from Health Management and RS-232 from FPGA
	LEDs	User defined by the FPGA and Health Management
Onboard Interfaces		None
VPX Interfaces	**Slot Profiles**	See Ordering Options
	Rear IO	P1: x8 high speed serial links (PCIe/10GbE/SRIO/Aurora per FPGA load)
		P2: x8 high speed serial links (10GbE/SRIO/Aurora per FPGA load)
	Power Supplies	P0: VS1 = 12V as the main voltage draw
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 ISO9001:2015 and AS9100D 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

VPX598 – ABC-DEF-GHJ-KL0

A = RF Direct Clock Sampling	D = FPGA Speed	G = Applicable Slot Profiles	K = Nyquist Zones (ADC ONLY)
0 = Direct Clock 1 = Onboard Wideband PLL	0 = Reserved 1 = High 2 = Highest*	0 = 10 HP, IEEE 1101	0 = 1st/2nd Nyquist 1 = 2nd/3rd Nyquist
B = DAC	**E = Clock Holdover Stability**	**H = Environmental**	**L = VPX Connector Type**
0 = Quad DAC Channels (AD9162) 1 = Quad DAC Channels (AD9164) 2 = No DAC 3 = Octal DAC Channels (AD9162)+ 4 = Octal DAC Channels (AD9164)+ 5 = Quad DAC (AD9162) with attenuation+† 6 = Octal DAC (AD9164) with attenuation+†	0 = Standard (XO) 1 = Stratum-3 (TCXO)	See Environmental Specification	0 = Standard 50u Gold Rugged 1 = KVPX Connectors
C = ADC	**F = PCIe Option (P1)****	**J = Conformal Coating**	
0 = Quad ADC Channels (AD9208) 1 = Dual ADC Channels (AD9208) 2 = No ADC 3 = Octal ADC Channels (AD9208)++	0 = No PCIe (40GbE, 10GbE, SRIO, etc.) 1 = PCIe x4	0 = No coating 1 = Humiseal 1A33 Polyurethane 2 = Humiseal 1B31 Acrylic	

Notes: *Minimum Order Quantity applies for these FPGA SKU's.

**When the ports are not PCIe the lanes are electrically compatible with SRIO, XAUI, and other SerDes protocols.

+Option C must be 2 (C= 2) to select this option, Minimum Order Quantity applies.

++Option B must be 2 (B = 2) to select this option, Minimum Order Quantity applies.

†Attenuators are programmable

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.

Environmental Specification

	Air Cooled		Conduction Cooled		
Option H	**H = 0**	**H = 1**	**H = 2**	**H = 3**	**H = 4**
Operating Temperature	AC1* (0°C to +55°C)	AC3* (-40°C to +70°C)	CC1* (0°C to +55°C)	CC3* (-40°C to +70°C)	CC4* (-40°C to +85°C)
Storage Temperature	C1* (-40°C to +85°C)	C3* (-50°C to +100°C)	C1* (-40°C to +85°C)	C3* (-50°C to +100°C)	C3* (-50°C to +100°C)
Operating Vibration	V2* (0.04 g2/Hz max)	V2* (0.04 g2/Hz max)	V3* (0.1 g2/Hz max)	V3* (0.1 g2/Hz max)	V3 (0.1 g2/Hz max)
Storage Vibration	OS1* (20g)	OS1* (20g)	OS2* (40g)	OS2* (40g)	OS2* (40g)
Humidity	95% non-condensing	95% non-condensing	95% non-condensing	95% non-condensing	95% non-condensing

Notes: *Nomenclature per ANSI/VITA 47. Contact local sales office for conduction cooled (H = 2, 3, 4).

Available Signal Bandwidth

Ordering Option (Number of Channels)	Interpolation (Minimum)	Maximum Fdata (MHz)	Available Signal Bandwidth (MHz)
Dual/Octal/Quad ADC (C = 0/1/3)	Bypass x1	3000	1500
Quad DAC (B = 0/1)	Bypass x1	Fdac = 5000	Fdac/2 = 2500
Octal DAC (B = 4)	Decimation x4	Fdac/4 = 1250	80% to 90% of 1250 (total I/Q)

Related Products

VPX516

- 3U FPGA carrier for FPGA Mezzanine Card (FMC) per VITA 46 and VITA 57
- Xilinx Virtex-7 690T FPGA in FFG-1761 package
- High-performance clock jitter cleaner

VPX592

- 3U FPGA carrier for FMC per VITA 46 and VITA 57
- Xilinx Kintex UltraScale™ XCKU115 FPGA
- High-performance clock jitter cleaner

VPX599

- Xilinx Kintex UltraScale™ XCKU115 FPGA
- Dual ADC 12-bit @ 6.4 GSPS
- Dual DAC 16-bit @ 12 GSPS (AD9162 or AD9164)

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