

AMC596

Virtex-7 UltraScale™ XCVU440 FPGA
with P2040 and PinoutPlus™, AMC



AMC596

Key Features

- Single module, mid-size AMC (full-size optional)
- Xilinx UltraScale™ XCVU440 w/ QorIQ PPC2040
- 8 GB of DDR4 (single bank of 64-bits)
- 20 SERDES lanes optionally routed to Tongue 2 for high-bandwidth connectivity to neighboring slot
- Ideal for ASIC prototyping/emulation
- AMC Ports 4-11 are routed to FPGA per AMC.1, AMC.2 and AMC.4 (protocols such as PCIe, SRIO, 10GbE/40GbE, etc. are FPGA programmable)
- AMC Ports 4-11 are routed to FPGA per AMC.1, AMC.2 and AMC.4 (protocols such as PCIe, SRIO, 1/10/40GbE, etc. are FPGA programmable)
- AMC Ports 12-15 and 17-20 are routed to the FPGA
- AMC FCLKA, TCLKA, TCLKB, TCLKC and TCLKD are routed

Benefits

- Electrical, mechanical, software, and system-level expertise in house
- Full system supply from industry leader
- AS9100 and ISO9001 certified company



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AdvancedMC™



AMC596

The AMC596 is based on the Virtex-7 UltraScale™ XCVU440 FPGA in FLGA2892 package with an onboard Power PC P2040 and is compliant to the AMC.1, AMC.2, AMC.3 and/or AMC.4 specification.

The module provides 20 SERDES lanes on tongue 2, providing high-bandwidth connectivity to another module at a very high speed (where supported by appropriate chassis). The use of the tongue 2 connector complies with the AMC.0 specification.

The onboard, re-configurable FPGA interfaces to the AMC FCLKA and TCLKA-D via a MLVDS Cross Bar Switch (CBS). The FPGA has interface to one DDR4, 64-bit wide, with 8 GB total memory. This allows for large buffer sizes to be stored during processing as well as for queuing the data to the host.

The onboard quad core P2040 runs at 1.2 GHz with 1 GB of DDR3, 128 MB of Boot Flash, and a 32 GB SD Card. The PPC has x4 PCIe interface to the FPGA in addition to its local bus. The PPC has its dual GbE routed to Ports 0 and 1 of the AMC via a mux to also allow FPGA routing to the Ports. The same applies to Ports 2-3 (PPC SATA Ports or directly to the FPGA via mux selection).



Figure 1: AMC596

Block Diagram

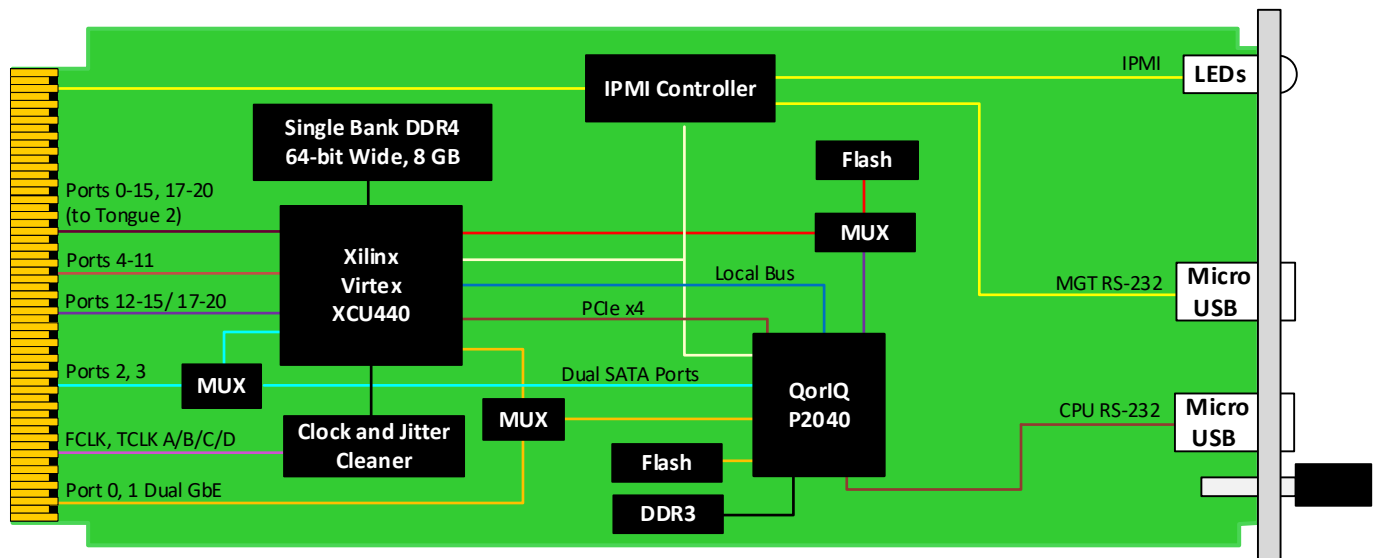


Figure 2: AMC596 Functional Block Diagram

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 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](#).

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 3), 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.

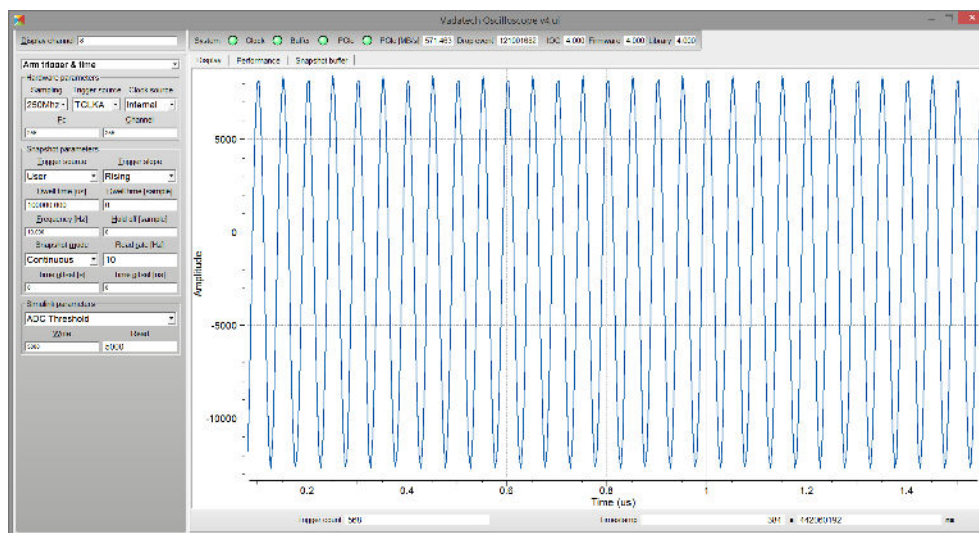


Figure 3: Typical Graphic User Interface Display

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).

Specifications

Architecture		
Physical	Dimensions	Single module, mid-size (full-size and Extended -size optional)
		Width: 2.89" (73.5 mm)
		Depth 7.11" (180.6 mm)
Type	AMC FPGA	Xilinx Virtex UltraScale™ XCVU440 FPGA
		Single bank of DDR4 (64-bit wide)
Standards		
AMC	Type	AMC.1, AMC.2 and AMC.4 (FPGA programmable)
Module Management	IPMI	IPMI v2.0
PCIe	Lanes	Dual x4 or single x8 via FPGA to AMC
SRIO/Aurora	Lanes	Dual x4 via FPGA to AMC
Ethernet	1/10/40GbE	Dual 1/10/40GbE via FPGA (Ports 0-1, 4-11) and/or Dual 1000-BaseBX from PPC to Ports 0-1
Configuration		
Power	AMC596	~65W (application specific)
Environmental	Temperature	See Ordering Options and Environmental Spec Sheet
		Storage Temperature: -40° to +85°C
	Vibration	Operating 9.8 m/s ² (1G), 5 to 500 Hz
	Shock	30Gs on each axis
	Relative Humidity	5 to 95% non-condensing
Front Panel	Interface Connectors	Micro USB for MGT RS-232 and CPU RS-232
		LEDs IPMI Management Control
		4 user defined LEDs
	Mechanical	Hot swap ejector handle
Software Support	Operating System	Linux, VxWorks and Windows
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

AMC596 – ABC-DEF-GHJ

A = Ports 12-15 (Tongue 1) 0 = Not connected to FPGA 1 = LVDS 2 = SERDES	D = Ports 17-20 (Tongue 1) 0 = Not connected to FPGA 1 = Connected to FPGA as SERDES 2 = Connected to FPGA as MLVDS	G = Clock Holdover Stability 0 = Standard (XO) 1 = Stratum-3 (TCXO)
B = Ports 0-15, 17-20 (Tongue 2) 0 = No Tongue 2 1 = Tongue 2	E = FPGA Speed 1 = Low 2 = High 3 = Highest	H = Ports 4-11 (Tongue 2) 0 = No PCIe 1 = PCIe on Ports 4-11
C = Front Panel 1 = Reserved 2 = Mid-size 3 = Full-size 4 = Extended (8HP) 5 = Reserved 6 = Mid-size, MTCA.1 (captive screw) 7 = Full-size, MTCA.1 (captive screw) 8 = Extended-size, MTCA.1 (captive screw)	F = PCIe Option (Tongue 1) 0 = No PCIe 1 = PCIe on Ports 4-7 2 = PCIe on Ports 8-11 3 = PCIe on Ports 4-11	J = Temperature Range and Coating 0 = Commercial (–5° to +55°C), No coating 1 = Commercial (–5° to +55°C), Humiseal 1A33 Polyurethane 2 = Commercial (–5° to +55°C), Humiseal 1B31 Acrylic 3 = Industrial (–20° to +70°C), No coating 4 = Industrial (–20° to +70°C), Humiseal 1A33 Polyurethane 5 = Industrial (–20° to +70°C), Humiseal 1B31 Acrylic 6 = Extended (–40° to +85°C), Humiseal 1A33 Polyurethane* 7 = Extended (–40° to +85°C), Humiseal 1B31 Acrylic*

Notes: *Conduction cooled; temperature is at edge of module. Consult factory for availability
 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

AMC751



- Processor AMC Intel® Xeon E5-2648L v4
- x16 PCIe Gen 3 via Tongue 2, optional PCIe to Ports 12-15, 17-20
- 40GbE (or 10GbE) on Ports 4-7 and 8-11 (AMC.2)

UTC020



- Single module, full-size per AMC.0
- Dual -36V DC to -75V DC input, 936W (available in 468W)
- Hot swappable with support for power module redundancy

VT899



- MTCA System Platform 5" x 7U x 9" deep. (with handles 10" deep)
- Up to six AMCs: 6 full-size single-width or 3 full-size double width
- Redundant Cooling Units

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