

AMC592 – Kintex UltraScale FPGA Carrier for FMC, AMC

AMC FPGA Carrier, Kintex UltraScale™



KEY FEATURES

- AMC FPGA carrier for FMC per VITA-57
- Xilinx UltraScale™ XCKU115 FPGA
- Supported by DAQ Series™ data acquisition software
- AMC Ports 12-15 and 17-20 are routed to the FPGA for direct FPGA to FPGA board communication
- AMC Ports 4-11 are routed to FPGA per AMC.1, AMC.2 and AMC.4 (protocols such as PCIe, SRIQ, 1/10/40GbE, etc. are FPGA programmable)
- Two banks of 64-bit wide and a single bank of 32-bit wide DDR-4 for a total of 20GB
- AMC FCLKA, TCLKA, TCLKB, TCLKC and TCLKD are routed
- Clock jitter cleaner
- Single module, mid-size AMC (full-size optional)
- IPMI 2.0 compliant

AdvancedMC™

Benefits of Choosing VadaTech

- Xilinx UltraScale™ XCKU115 FPGA
- 20GBytes of DDR-4 memory
- Electrical, mechanical, software, and system-level expertise in house
- Full system supply from industry leader
- AS9100 and ISO9001 certified company

The AMC592 is an AMC FPGA Carrier with an FMC (VITA 57) interface. The unit has an on-board, re-configurable Kintex UltraScale FPGA which interfaces directly to the AMC FCLKA, TCLKA-D, FMC DP0-9 and all FMC LA/HA/HB pairs. The FPGA has interface to three banks of DDR4 memory channels. This allows for large buffer sizes to be stored during processing as well as for queuing the data to the host.

The AMC592 is compliant to the AMC.1, AMC.2 and/or AMC.4 specification, and supports direct AMC-to-AMC connections over ports 12-15 and 17-20.

The AMC592 has a single FMC connector to accept FMCs from VadaTech's extensive range of data acquisition, networking and RF units, and other 3rd party VITA-57 compliant modules.

REFERENCE DESIGN

VadaTech provides several 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 3U 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 geared 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:

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

Xilinx provides Vivado Design Suite for developing applications on Xilinx based FPGAs. VadaTech provide reference VHDL developed using the Vivado Design Suite for testing basic hardware functionality. The reference VHDL is royalty free to use and modify on VadaTech products but customers are restricted from redistributing the reference code and use of this code for any other purpose.

The reference VHDL is shipped in one or more files based on number of ordering options. Not all ordering option have an impact on the FPGA and a new 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 design pre-compiled images make use of hardware evaluation licenses, where necessary, instead of full license. VadaTech does not provide license for the Vivado tool or Xilinx IP cores, please contact Xilinx for more information.

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

[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 (GUI) which includes 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 customise system behaviour or develop their own application on the AMC/FMC hardware.

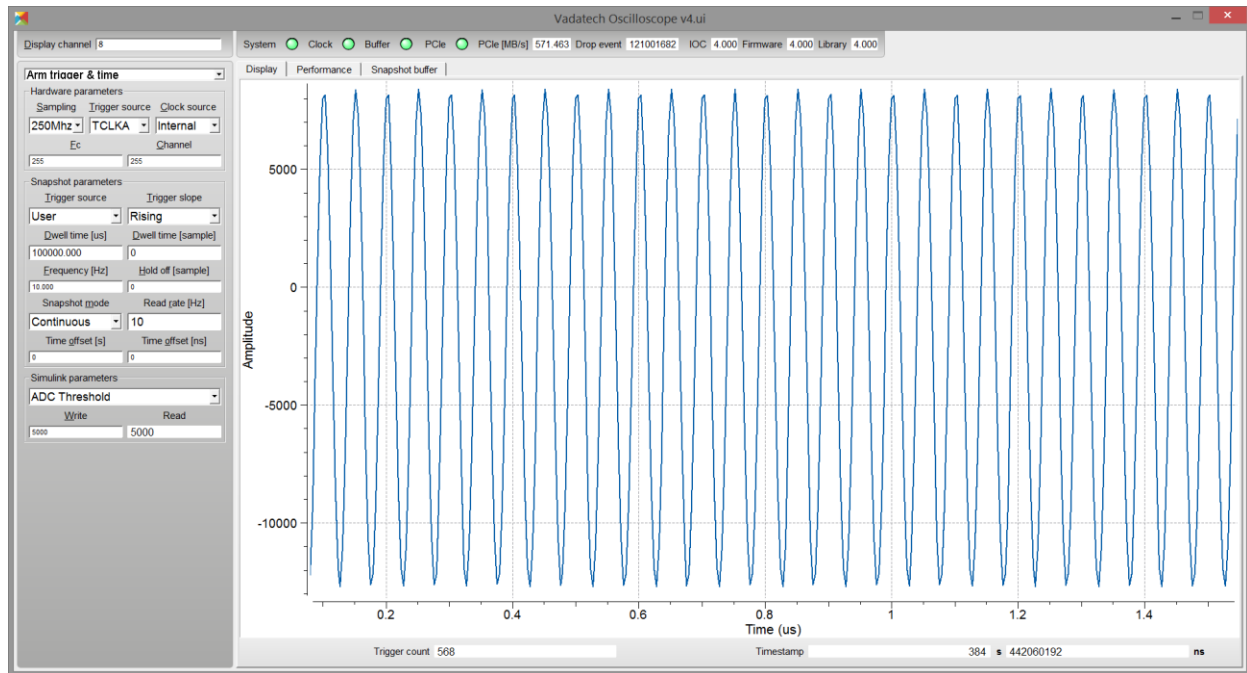


Figure 1: Typical User Interface Display

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).

The DAQ Series software provides ability to easily implement system modelling and automatic code generation from Simulink® and MATLAB® (The Mathworks, Inc.) into Vivado FPGA project via System Generator® (Xilinx). This allows the programmer to interface with the hardware, program the FPGA at high level and benefit from:

- Vivado integration
- DSP modelling
- Bit and cycle accurate floating and fixed-point implementation
- Automatic code generation of VHDL or Verilog from Simulink
- Hardware co-simulation

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)

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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.

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

Note that VHDL source code is not provided for the DMA engine and memory block (provided as Netlists).

Full source code is provided for the libraries, sequencer, Linux driver and GUI, allowing users to easily customize or brand to their own requirements.

BLOCK DIAGRAM

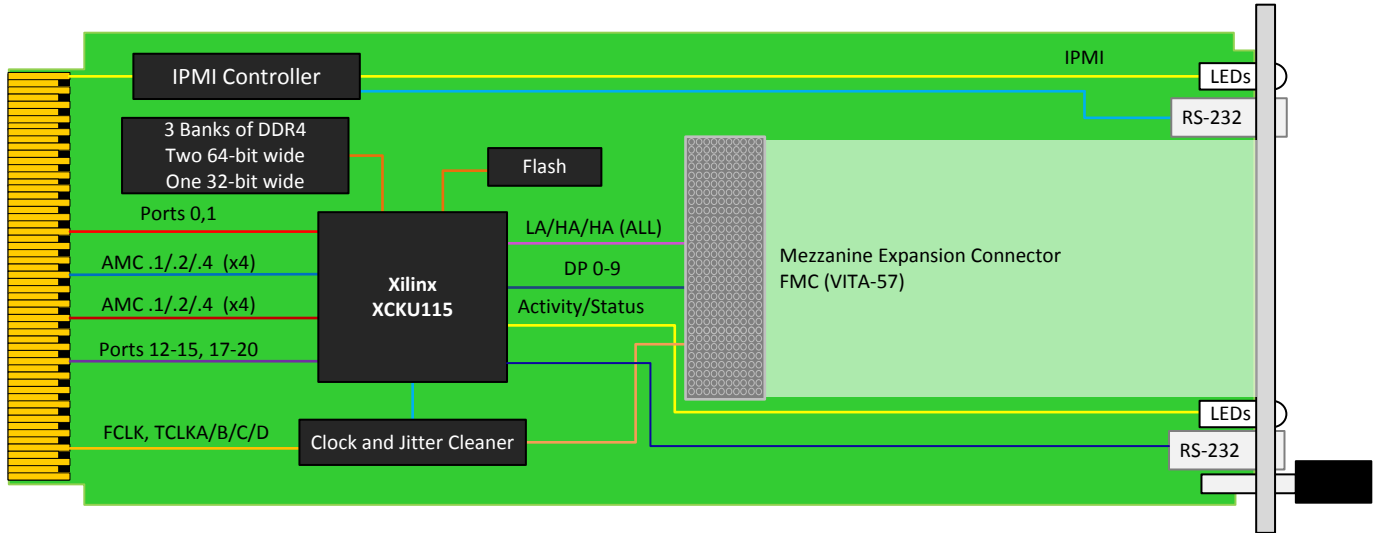


Figure 2: AMC592 Block Diagram

FRONT PANEL

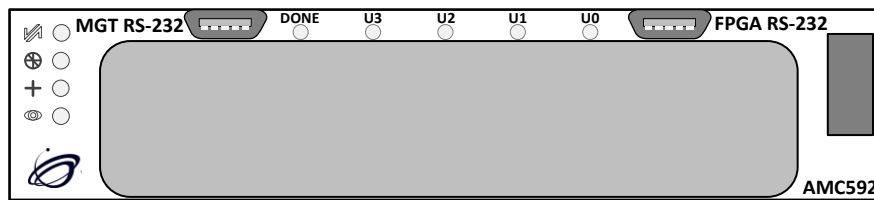


Figure 3: AMC592 Front Panel

SPECIFICATIONS

Architecture			
Physical	Dimensions	Single module, mid-size (full-size optional)	
		Width: 2.89" (73.5 mm)	
		Depth 7.11" (180.6 mm)	
Type	AMC FPGA Carrier	Xilinx UltraScale™ XCKU115 FPGA	
		Three banks of DDR4	
		Single FMC slot	
Standards			
AMC	Type	AMC.1, AMC.2, and AMC.4 (FPGA programmable)	
Module Management	IPMI	IPMI version 2.0	
PCIe	Lanes	Dual x4 via FPGA to AMC	
SRIO/Aurora	Lanes	Dual x4 via FPGA to AMC	
Ethernet	10 GbE and GbE	Dual GbE and 10/40GbE	
Configuration			
Power	AMC592	Carrier is ~45W (without mezzanine) application specific (may go up to 65W)	
Environmental	Temperature	Operating Temperature: -5° to 45°C (55°C for limited time, performance restrictions may apply), industrial and military versions also available. (See environmental spec sheet)	
		Storage Temperature: -40° to +85°C	
		Vibration	Operating 9.8 m/s ² (1.0 G), 5 to 500Hz
		Shock	30Gs on each axis
	Relative Humidity	5 to 95 per cent, non-condensing	
Front Panel	Interface Connectors	Front panel FMC, MGT RS-232, FPGS-RS232	
	LEDs	IPMI management control	
		4 user defined LEDs, 5 general status LEDs	
	Mechanical	Hot swap ejector handle	
Software Support	Operating System	None	
Conformal Coating		Humiseal 1A33 Polyurethane (Optional)	
		Humiseal 1B31 Acrylic (Optional)	
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		

INTEGRATION SERVICES AND APPLICATION-READY PLATFORMS

VadaTech has a full ecosystem of ATCA and μ TCA products including chassis platforms, shelf managers, AMC modules, Switch and Payload Boards, Rear Transition Modules (RTM), 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

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ORDERING OPTIONS

AMC592 – 00C – DEF – GHJ

C = Front Panel Size

- 1 = Reserved
- 2 = Mid-size
- 3 = Full-size
- 4 = Reserved
- 5 = Mid-size, MTCA.1 (captive screw)
- 6 = Full-size, MTCA.1 (captive screw)

D = Ports 12-15 and 17-20

- 0 = Not connected to FPGA
- 1 = Connected to FPGA

E = FPGA Speed

- 1 = Reserved
- 2 = High
- 3 = Highest

F = PCIe Option

- 0 = No PCIe
- 1 = PCIe on ports 4 – 7
- 2 = PCIe on ports 8 – 11
- 3 = PCIe on ports 4 – 11

G = Clock Holdover Stability

- 0 = Standard (XO)
- 1 = Stratum-3 (TCXO)

H = Temperature Range

- 0 = Commercial (–5° to +45° C)
- 1 = Industrial (–20° to +70° C)
- 2 = Extended (–40° to +85° C)*

J = Conformal Coating

- 0 = None
- 1 = Humiseal 1A33 Polyurethane
- 2 = Humiseal 1B31 Acrylic

*Edge of module for conduction-cooled boards

RELATED PRODUCTS



VT899 Cube Chassis



FMC223 High Speed
FMC for DAC



UTC020 1000W
Power Module

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