

AMC549

SOFI Carrier UltraScale+™



AMC549

Key Features

- Serial Optimized FPGA Interface (SOFI) Carrier
- Xilinx UltraScale+™ XCVU13P FPGA
- Dual Tongue to allow additional x16 SERDES routing with x8 additional LVDS on Tongue two
- Option for high-speed ADC/DAC (see SOFI catalogue) [A/D & D/A \(vadatech.com\)](http://A/D & D/A (vadatech.com))
- Single bank of DDR4 64-bit wide 8 GB Total
- 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) with additional x16 SERDES on Tongue two
- AMC FCLKA, TCLKA, TCLKB, TCLKC and TCLKD are routed
- Clock Jitter cleaner
- IPMI 2.0 compliant

Benefits

- Multiple SOFI options
- Most high speed ADC/DAC from TI and Analog Devices
- Xilinx UltraScale+™ XCVU13P 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



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AMC549

The AMC549 is SOFI carrier that allows any of the VadaTech SOFI module to interface with the high speed UltraScale+™ XCVU13P FPGA. The module has a second tongue which allows addition x16 SERDES routed to the backplane.

The unit has an onboard, re-configurable UltraScale+™ XCVU13P FPGA that directly interfaces with high speed ADC/DAC and a single bank of DDR4 memory channels (64-bit wide for a total of 8 GB). This allows for large buffer sizes to be stored during processing as well as for queuing the data to the host.

The AMC549 8 HP panel size will occupy two mid-size slots in a chassis and is available for conduction cooled options.

List of SOFI Module: [A/D & D/A \(vadatech.com\)](http://vadatech.com/A/D&D/A)



Figure 1: AMC549



Figure 2: AMC549 Front View



Figure 3: AMC549 Front View with SOF221



Figure 4: AMC549 Top View



Figure 5: AMC549 Top View with SOF221



Figure 6: AMC549 Front Panel View

The diagram illustrates the internal architecture of the Xilinx XCVU13P SoC and its external interfaces. The central component is the **Xilinx XCVU13P** SoC, which is connected to various internal blocks and external components.

Internal Components:

- IPMI Controller:** Connected to the IPMI interface.
- Single Bank of DDR4 64-bit Wide 8 GB:** Connected to the SoC.
- Flash:** Connected to the SoC.
- Cross Bar Switch:** Connected to the SoC and the SOFI Interface.
- SOFI Interface:** Connected to the SoC and the SOFI I/O.

External Interfaces:

- IPMI:** Connected to the IPMI Controller.
- MGT RS-232:** Connected to the SoC.
- FPGA RS-232:** Connected to the SoC.
- Micro USB:** Two ports connected to the SoC.
- OCuLink:** Connected to the SoC.
- SOFI I/O:** Connected to the SOFI Interface.
- LEDs:** Two sets of LEDs connected to the SoC.
- LEDs:** A set of LEDs connected to the Cross Bar Switch.

Internal Connections:

- T2 ports 17-20 LVDS:** Connected to the SoC.
- T2 ports 0-15 Ports 0,1:** Connected to the SoC.
- AMC .1/.2/.4 (x4) 4-7:** Connected to the SoC.
- AMC .1/.2/.4 (x4) 8-11:** Connected to the SoC.
- AMC Ports 12-15:** Connected to the SoC.
- AMC Ports 17-20:** Connected to the SoC.
- FCLKA:** Connected to the SoC.
- TCLK A/B/C/D:** Connected to the SoC.

Other Labels:

- 8 LVDS Pairs or Single ended as Trigger in/out, etc.:** Connected to the SoC.
- A=0, Direct RF:** Connected to the SoC.

Figure 7: AMC549 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 2), 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.

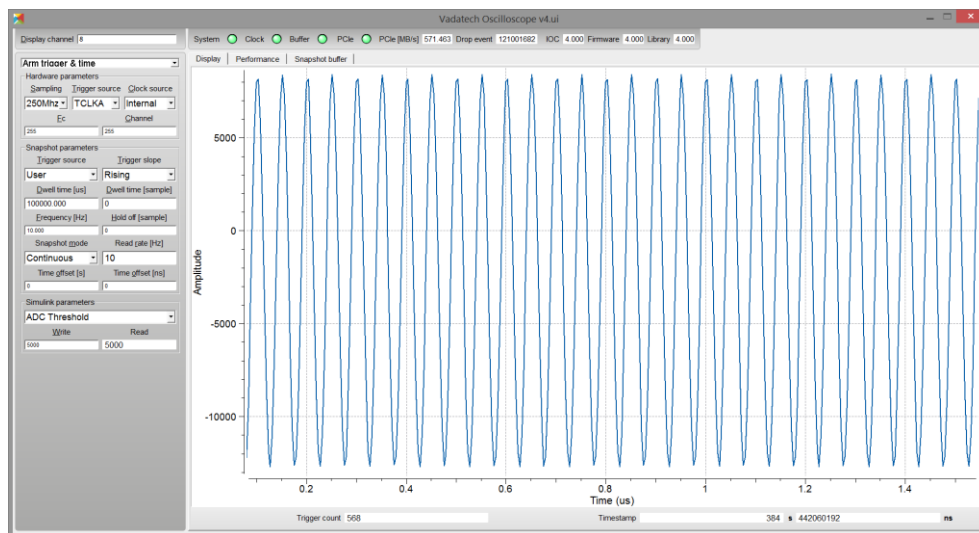


Figure 2: Typical Graphic User Interface Display

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, 8 HP
		Width: 2.89" (73.5 mm)
		Depth: 7.11" (180.6 mm)
Type	AMC FPGA ADC/DAC	Xilinx UltraScale+™ XCVU13P FPGA
		Single bank of DDR4, 64-bit, 8 GB
		Quad ADC/Quad DAC (SOFI Catalogue A/D & D/A (vadatech.com))
Standards		
AMC	Type	AMC.1, AMC.2 and AMC.4 (FPGA Programmable)
Module Management	IPMI	IPMI v2.0
PCIe	Lanes	Single x4 or x8 via FPGA to AMC
SRIO/XAUI	Lanes	Single or Dual x4 via FPGA to AMC
SerDes	Lanes	x8 via FPGA to AMC Ports 12-15 and 17-20; T2 Ports 0-15 and LVDS on ports 17-20
Ethernet	GbE and 10 GbE	Dual GbE and 10/40GbE
Configuration		
Power	AMC549	~75W application and SOFI module dependent
Environmental	Temperature	See Ordering Options and Environmental Spec Sheet
		Storage Temperature: -40° to +85°C
	Vibration	Operating 9.8 m/s² (1G), 5-500 Hz on each axis
	Shock	Operating 30Gs each axis
	Relative Humidity	5 to 95% non-condensing
Front Panel	Interface Connectors	SOFI module dependent
		Micro USBs for MGT RS-232 and FPGA RS-232
		Front panel I/O for high speed LVDS differential (8 pairs) or singled ended
	LEDs	IPMI management control
		8 user defined LEDs
	Mechanical	Hot-swap ejector handle
Software Support	Operating System	Agnostic
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

AMC549 – ABC-0EF-00J

AB= SOFI Module†		
00 = SOF221 (2xADC12DJ5200 and 2x AD9162) 01 = Contact VadaTech Sales 02 = Contact VadaTech Sales 03 = Contact VadaTech Sales		
E = FPGA Speed		
1 = High (-2)* 2 = High (-2LE) 3 = Highest (-3E)*		
C = Front Panel Size	F = PCIe Option**	J = Temperature Range and Coating
0 = 8 HP 7 = 7 HP MTCA.2 Rugged 8 = 8 HP, MTCA.1 (captive screw both side) 9 = 8 HP, SLF*** (captive screw one side)	0 = No PCIe 1 = PCIe on Ports 4-7 2 = PCIe on Ports 8-11 3 = PCIe on Ports 4-11 (x8 or dual x4 requires PCIe softcore for 8-11)	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

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.

***Single Latch Flange (SLF)

†Contact VadaTech to assign part number for the SOFI interface from the catalogue

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

VT951



- MicroTCA rugged 1U 19" rackmount chassis platform
- Designed to meet MIL-STD-810F, MIL-STD-901D for shock/vibration
- Designed to meet MIL-STD-461E for EMI

FMC214



- Dual complete transceiver signal chain solution using Analog Devices AD9361 transceiver
- Frequency range 70 MHz to 6 GHz with instantaneous bandwidth from 200 kHz to 56 MHz
- MIMO transceiver is Time Domain Duplex (TDD) and Frequency Domain Duplex (FDD) compatible

AMC599



- Xilinx UltraScale™ XCKU115 FPGA
- Dual ADC 12-bit @ 6.4 GSPS or quad ADC at 3.2 GSPS
- Dual DAC 16-bit @ 12 GSPS (AD9162 or AD9164)

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