Lenovo ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter User Guide

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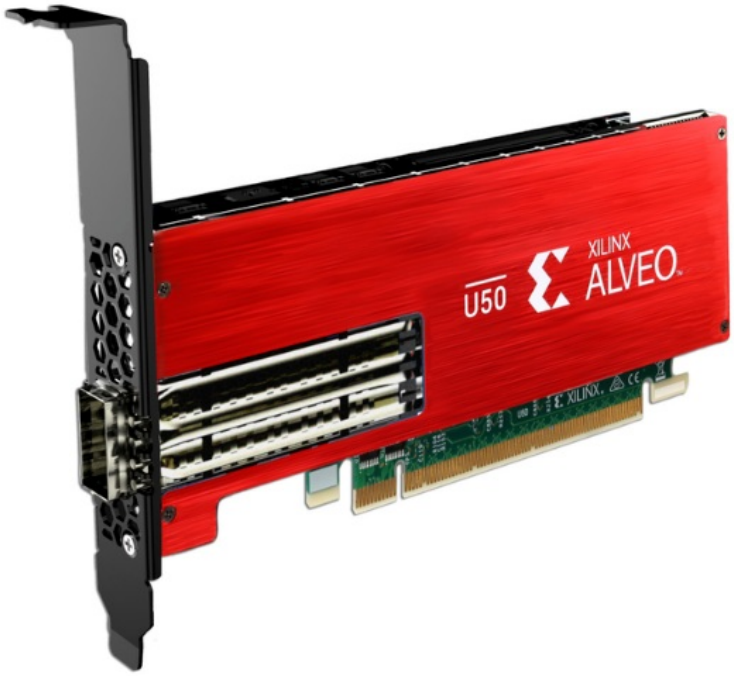

ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter

Product Guide

The ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter is an advanced programmable computational accelerator that provides provide optimized acceleration for workloads in financial computing, machine learning, computational storage, high performance computing, and database search and analysis. The low-profile adapter is built on Xilinx UltraScale+ architecture includes 8GB HBM2 memory, 100GbE networking, and a PCIe 4.0 host interface. The Xilinx Vitis and Vitis AI development tools enable both Xilinx and third-party accelerated applications and solutions.

The following figure shows the ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter.

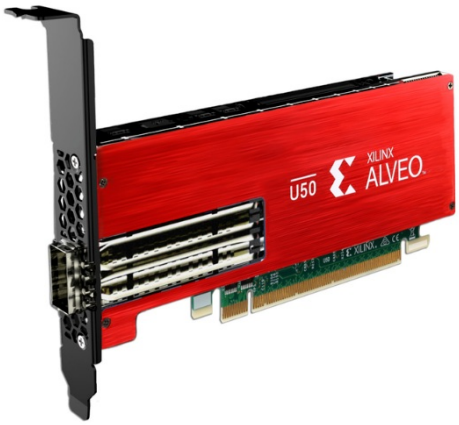

Figure 1. ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter

Did you know?

Customers can use the Xilinx Vitis Unified Software Platform to develop accelerated applications using RTL, C/C++ or OpenCL programming languages. Customers can also work with a growing ecosystem of hardware-accelerated partner libraries and pre-built applications to maximize their investment in on-premise data acceleration.

Some of the key 3rd party solutions available today are with Graph Analytics with TigerGraph, and Storage compression / decompression with Eideticom, with additional solutions being constantly developed.

Part number information

The following table shows the part number for the adapter.

Table 1. Ordering information

Part number	Feature code	Description
4XC7A76757	BLC2	ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter

The part numbers include the following:

- One Xilinx adapter
- Low-profile (2U) and full-height (3U)
- adapter brackets Documentation

Supported cables and transceivers
This section lists the supported transceivers and cables.
Table 2. Supported transceivers

Part number	Feature code	Description
100Gb transceivers		
7G17A03539	AV1D	Lenovo 100GBase-SR4 QSFP28 Transceiver
4M27A67042	BFH1	Lenovo 100Gb SR4 QSFP28 Ethernet Transceiver

The following table lists the supported fiber optic cables and Active Optical Cables. Table 3. Optical cables

Part number	Feature code	Description
QSFP 40Gb Optical Cables (these cables require a transceiver)		
00VX003	AT2U	Lenovo 10m QSFP+ MPO-MPO OM3 MMF Cable
00VX005	AT2V	Lenovo 30m QSFP+ MPO-MPO OM3 MMF Cable
QSFP28 100Gb Ethernet Active Optical Cables		
4Z57A10844	B2UZ	Lenovo 1m 100G QSFP28 Active Optical Cable
7Z57A03546	AV1L	Lenovo 3m 100G QSFP28 Active Optical Cable
7Z57A03547	AV1M	Lenovo 5m 100G QSFP28 Active Optical Cable
7Z57A03548	AV1N	Lenovo 10m 100G QSFP28 Active Optical Cable
7Z57A03549	AV1P	Lenovo 15m 100G QSFP28 Active Optical Cable
7Z57A03550	AV1Q	Lenovo 20m 100G QSFP28 Active Optical Cable

The following table lists the supported direct-attach copper (DAC) cables. Table 4. Copper cables

Part number	Feature code	Description
QSFP-to-QSFP 40Gb Cables		
49Y7890	A1DP	1m QSFP+-to-QSFP+ cable
49Y7891	A1DQ	3m QSFP+-to-QSFP+ cable
00D5810	A2X8	5m QSFP+ to QSFP+ Cable
00D5813	A2X9	7m QSFP+ to QSFP+ Cable
QSFP28 100Gb Ethernet Passive DAC Cables		
7Z57A03561	AV1Z	Lenovo 1m Passive 100G QSFP28 DAC Cable
7Z57A03562	AV20	Lenovo 3m Passive 100G QSFP28 DAC Cable
7Z57A03563	AV21	Lenovo 5m Passive 100G QSFP28 DAC Cable

Features

The ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter offers a number of features, including the following:

- Built for Performance & Efficiency
  - Faster application performance from 8GB of HBM memory (32 AXI channel access) and PCIe Gen4 interconnect
    Low latency network capability through 100GbE networking
- Optimized Performance Across Broadest Range of Workloads
  - Accelerates compute, network, storage workloads
  - Maximized and future proof application performance as workloads and algorithms evolve through reconfigurable fabric – unlike fixed-architecture alternatives
- Deploy in Any Server – From On-premises to Cloud
  - Built for scale out architectures with a low-profile form factor and low 75-watt power envelope
- Powerful Developer Platform
  - Take advantage of a large and growing library of Xilinx and partner applications Develop differentiated solutions leveraging Xilinx's Vitis unified software platform
- Computational Storage Acceleration
  - Alveo U50 delivers the fastest and most flexible PCIe-based compression/decompression acceleration
  - Lower cost – Alveo U50 accelerated compression delivers 33% lower cost. (Based on 10GB/sec throughput and 2:1 compression)
- Financial Simulation – Grid Computing
  - Fastest time to insight
  - Reduced operational costs and maximum power efficiency

    - Deterministic latency delivers consistent performance
- Ultra-Low Latency Networking
    - 20x lower latency
    - Alveo U50 delivers sub-500ns trading time vs CPU latency of 10µs
    - Deterministic throughput timing
- Deep Learning Inference Acceleration
    - 10x higher throughput – translated symbols per second
    - 25x lower latency
    - Significantly improved power efficiency per node
- Database Analytics Acceleration
    - Higher query throughput & response time than
    - CPU Higher cost effectiveness per node
    - Reduced Operational cost
    - Real time results

Technical specifications

The Xilinx Alveo U50 adapter has the following specifications:

- Architecture: UltraScale+
- Form factor: single-slot low-profile half-length
- Logic resources:
    - Lookup tables: 872,000
    - Registers: 1,743,000
    - DSP slices: 5,952
- Memory:
    - 8 GB HBM2 high-bandwidth memory
    - Band widtah: 316 GB/s peak, 201 GB/s nominal
- Network interface: 1-port QSFP28 (100GbE)
- Clock precision: IEEE 1588
- Host interface: PCIe 3.0 x16, dual PCIe 4.0 x8, CCIX Thermal solution: Passive
- Power (TDP): 75W maximum, 50W typical

Server support

The following tables list the ThinkSystem servers that are supported.
Table 5. Server support (Part 1 of 2)

Part Number	Description	Edge		1S Intel V2			2S Intel V2				AMD				Dense V2				4S V2		8S
		SE350 (7Z46 / 7D1X)	SE450 (7D8T)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)	SR670 V2 (7Z22 / 7Z23)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)
4XC7A76757	ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter	N	N	N	N	N	N	Y	Y	N	N	N	Y	Y	N	N	N	N	N	N	N

Table 6. Server support (Part 2 of 2)

Part Number	Description	1S Intel V1				2S Intel V1								Dense V1				4S V1		
		ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)	ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)
4XC7A76757	ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N

Operating system support

The Xilinx Alveo U50 adapter supports the operating systems listed in the following table.
Tip: This table is automatically generated based on data from Lenovo ServerProven.
Table 7. Operating system support for ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter, 4XC7A76757

Regulatory approvals
The Xilinx Alveo U50 adapter has the following hardware certifications:

- **Safety Compliance:**
  - UL 60950-1, 2nd Edition, 2014-10-14 (Information Technology Equipment – Safety – Part 1: General Requirements)
  - CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10-14 (Information Technology Equipment -Safety – Part 1: General Requirements)
  - EN 60950-1:2006+A11:2009+A1:2012+A12:2011+A2:2013 (European Union)
  - IEC 60950-1:2005 (2nd Edition); Am 1:2009 (International)
  - EU LVD Directive 2014/35/EU
  - IEC 62368-1:2014 (2nd Edition)
- **EMC Compliance:**
  - FCC Part 15 – Radiated & Conducted Emissions (USA)
  - CAN ICES-3(A)/NMB-3(A) – Radiated & Conducted Emissions (Canada)
  - CISPR 32 – Radiated & Conducted Emissions (International)
  - EN55032: 2015 – Radiated & Conducted Emissions (European Union) EN55035:2017 – Immunity (European Union)
  - EMC Directive 2014/30/EU
  - VCCI (Class A)– Radiated & Conducted Emissions (Japan)
  - CNS13438 – Radiated & Conducted Emissions (Taiwan)
  - CNS 15663 – RoHS (Taiwan)
  - AS/NZS CISPR 32 – Radiated and Conducted Emissions (Australia/New Zealand) Article 58-2 of Radio Waves Act, Clause 3 (Korea)
- **Regulatory Compliance Markings:**
  - UL Listed Accessories Mark for the USA and Canada CE mark
  - FCC markings
  - VCCI marking
  - Australian C-Tick mark
  - Korea MSIP mark
  - Taiwan BSMI mark
  - German GS mark

Physical specifications
The Xilinx Alveo U50 adapter has the following physical specifications:

- Length: 168 mm (6.6 inches)
- Width: 69 mm (2.71 inches)
- Weight: 325g

Operating environment
The Xilinx Alveo U50 adapter is supported in the following environment:

- **Temperature:**
  - Operating: 0°C to 50°C (32°F to 122°F)
  - Storage: -40°C to 75°C (-40°F to 167°F)
- **Humidity:**
  - Operating: 8% to 80%
  - Storage: 5% to 95%

Warranty

One year limited warranty. When installed in a Lenovo server, the adapter assumes the server's base warranty and any warranty upgrades.
Related links and publications
For more information, refer to these web resources:

- Xilinx U50 product web page:
  http://www.xilinx.com/U50
- Application catalog for Xilinx adapters:
  https://www.xilinx.com/content/xilinx/en/products/app-store/alveo/all-apps.html
- Vitis Unified Software Platform:
  https://www.xilinx.com/products/design-tools/vitis/vitis-platform.html
- ServerProven compatibility
  http://www.lenovo.com/us/en/serverproven

Related product families
Product families related to this document are the following:

- Coprocessors and Accelerators 100 Gb
- Ethernet Connectivity
- Ethernet Adapters

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Documents / Resources

	Lenovo ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter [pdf] User Guide ThinkSystem Xilinx Alveo U50, Data Center Accelerator Adapter, ThinkSystem Xilinx Alveo U50 Data Center Accelerator Adapter

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