Alveo UL3524

Installation Guide

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Chapter 1

Introduction

The AMD Alveo™ UL3524 card is designed for ultra low latency applications for the fintech market. It consists of an AMD UltraScale+™ device with ultra-low latency GTF transceivers, QDR, and DDR memory. In addition, it has four QSFP-DD NIC ports supporting 32 GTF TX/RX pairs along with high-speed expansion connectors supporting 32 additional GTF TX/RX pairs.

The UL3524 is a full height, ¾ length, single slot PCIe® CEM 4.0 compliant card which supports passive cooling for closed-loop thermal control in the server PCIe expansion slot. It has a PCIe x16 physical connector with the upper eight lanes unconnected.

The card supports both appliance and PCIe power modes:

- In appliance mode, all power is drawn from the PCIe 12V AUX power connector.
- In PCIe power mode, power is drawn from both the PCIe 12 AUX power connector and the PCIe 12V edge connector.

The following figure shows the UL3524 card.

Figure 1: **UL3524 Card**

Designs can be developed with the AMD Vivado™ Design Suite where the full resources of the programmable logic device are made available for development.

Chapter 2

Accelerator Card Overview

Card Features

The following table lists high-level product details for the UL3524 card.

Table 1: **Alveo UL3524 Product Details**

Specification	UL3524
Product SKU	A-UL3524-P16G-PQ-G
Total electrical card load - PCIe Mode	180W
Total electrical card load - Appliance Mode	150W
Thermal design power (TDP)	125W
Thermal cooling solution	Passive
Weight	832g
Form factor	Full-height, ¾ length, single slot
Network interface	Four QSFP-DD
PCIe interface	PCIe Gen4 x8
Expansion ports	Four ARF6 + two PicoClasp for sideband
QDR II+	72 MB 2 x 288 Mb QDR II+, 550 MHz
DDR4	16 GB 64b + 8b ECC at 2666 MT/s
1 PPS	1PPS IN port
Qualified for deployment	Yes
Vivado tools part number	XCVU2P-FSVJ2104-3-E
Card management	External SC MSP432P4011IRGCT
Power management	Power management with power management bus (PMBus) for voltage, current, and temperature monitoring including telemetry for major regulators
External power source	12V PCIe AUX 2x4
ADK2 Enabled	Yes
Configuration option	• 2 Gbit QSPI • JTAG over Micro-USB or ADK2
Debug interface	• UARTs over Micro-USB • PMBus, SMBus over ADK2 Debug Connector

Table 1: **Alveo UL3524 Product Details** *(cont'd)*

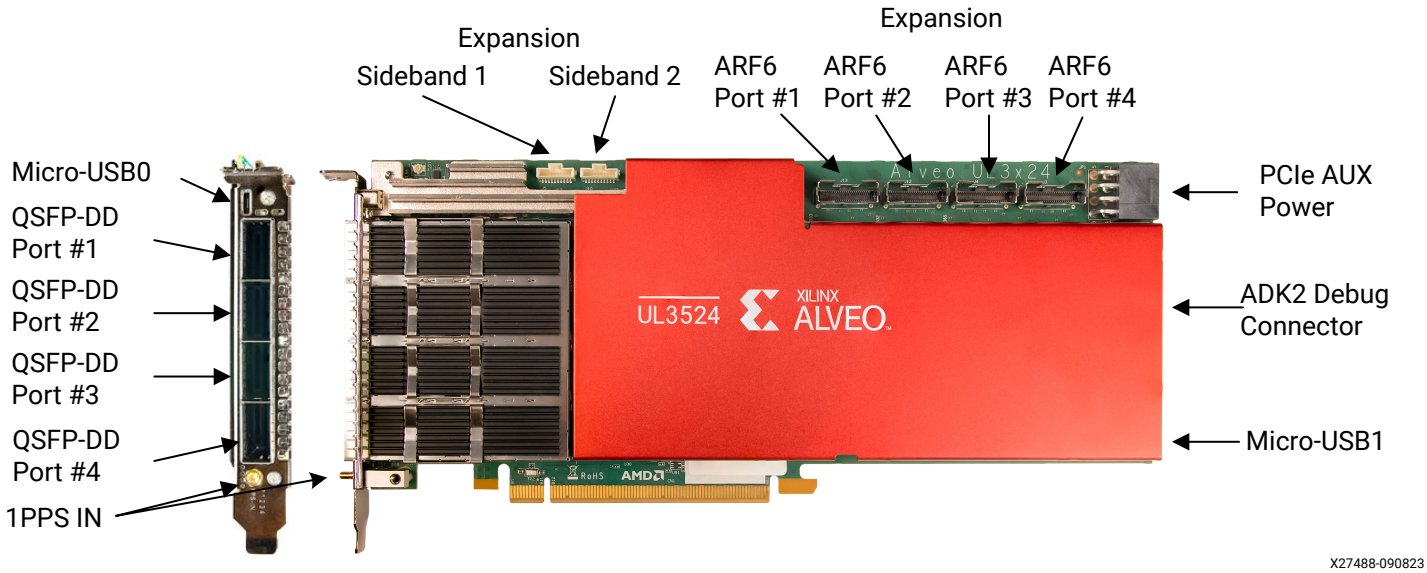
Specification	UL3524
Card security	None

Card Interfaces

The Alveo UL3524 accelerator card is available in a passive cooling configuration and is designed for installation into a data center server where controlled air flow provides direct cooling to the card. The following figure shows the Alveo UL3524 data center accelerator card, including the following interfaces:

- A PCI Express® card connector
- Four QSFP-DD NIC ports supporting 32 GTF TX/RX lanes
- Four ARF6 connectors supporting 32 GTF TX/RX lanes
- Micro-USB maintenance connector
- ADK2
- AUX power connector

Figure 2: **UL3524 Card Interfaces**



CAUTION! *Alveo data center accelerator cards are designed to be installed into a data center server, where controlled air flow provides direct cooling. If the cooling enclosure is removed from the card and the card is powered-up, external fan cooling airflow MUST be applied to prevent over-temperature shut-down and possible damage to the card electronics. Removing the cooling enclosure voids the board warranty.*

ATTENTION! *Les cartes Alveo sont conçues pour être installées dans un serveur pour Data Center, où le débit d'air contrôlé assure un refroidissement direct. Si le boîtier de refroidissement est retiré de la carte et que la carte est sous tension, le flux d'air de refroidissement du ventilateur externe DOIT être appliqué pour éviter l'arrêt en cas de surchauffe et d'éventuels dommages des composants électroniques de la carte. Le retrait du boîtier de refroidissement annule la garantie de la carte.*

VORSICHT! *Alveo-Beschleunigerkarten für Rechenzentren sind für die Installation in einem Rechenzentrumsserver konzipiert, wo ein kontrollierter Luftstrom für eine direkte Kühlung sorgt. Wenn das Kühlgehäuse von der Karte entfernt und die Karte eingeschaltet wird, MUSS ein externer Lüfter zur Kühlung zugeführt werden, um eine Abschaltung bei Übertemperatur und mögliche Schäden an der Kartenelektronik zu verhindern. Durch das Entfernen des Kühlgehäuses erlischt die Garantie der Platine.*

For card specifications, dimensions, list of card features, block diagram, and airflow requirements see the *Alveo UL3524 Ultra Low Latency Trading Data Sheet* (DS1009).

Minimum System Requirements

The minimum system requirements for running the Alveo UL3524 data center accelerator card are listed in the following table.

Table 2: **Minimum System Requirements**

Component	Requirement
Motherboard	PCI® Express 4.0-compliant with x16 slot, when running in PCIe power mode.
System Power Supply	PCIe 12V AUX power connector and the PCIe edge connector.

PCIe AUX Power

The card has an 8-pin PCIe auxiliary power connector. A PCIe auxiliary power cable must be plugged into the connector for the card to operate correctly.

Depending on your server or computer, an additional PCI Express auxiliary power cable or adapter might be needed. Consult your computer documentation for additional information.

***Note*:** This 8-pin connector is not compatible with an ATX12V/EPS12V power cable source. Ensure that the appropriate PCIe auxiliary power source is available, not an ATX12V/EPS12V power source. For more details see Answer Record 72298.

Qualified Servers

For a list of servers on which Alveo cards are qualified, contact the AMD sales team.

Card Installation Procedure

To reduce the risk of fire, electric shock, or injury, always follow basic safety precautions.

CAUTION! *You must always use an ESD strap or other antistatic device when handling hardware.*

ATTENTION! *Il est fortement recommandé d'utiliser un bracelet ESD ou autres dispositifs antistatiques.*

VORSICHT! *Beim Umgang mit Hardware müssen sie immer ein Erdungs Armband oder ein anderes antistatisches Gerät verwenden.*

Safety Instructions

Safety Information

To ensure your personal safety and the safety of your equipment:

- Keep your work area and the computer/server clean and clear of debris.
- Before opening the computer/system cover, unplug the power cord.

Dispositif de Sécurité

Pour assurer votre sécurité personnelle et la sécurité de votre équipement:

- Maintenez votre zone de travail et l'ordinateur/serveur propre et dégagé de débris.
- Avant d'ouvrir le capot de l'ordinateur/système, débranchez le cordon d'alimentation.

Sicherheitsinformation

Um ihre persönliche Sicherheit und die Sicherheit ihrer Ausrüstung zu gewährleisten:

- Halten sie ihren Arbeitsbereich und den Computer / Server sauber und frei von Ablagerungen.
- Ziehen sie vor dem Öeffnen der Computer / Systemabdeckung das Netzkabel ab.

Electrostatic Discharge Caution

Electrostatic discharge (ESD) can damage electronic components when they are improperly handled, and can result in total or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components.

To prevent ESD damage:

- Use an ESD wrist or ankle strap and ensure that it makes skin contact. Connect the equipment end of the strap to an unpainted metal surface on the chassis.
- Avoid touching the card against your clothing. The wrist strap protects components from ESD on the body only.
- Handle the card by its bracket or edges only. Avoid touching the printed circuit board or the connectors.
- Put the card down only on an antistatic surface such as the bag supplied in your kit.
- If you are returning the card to AMD Product Support, place it back in its antistatic bag immediately.

Attention aux Décharge Électrostatique (ESD)

L'ESD peut endommager les composants électroniques lorsqu'ils sont mal manipulés, et peut entraîner des défaillances totales ou intermittentes. Suivez toujours les procédures de prévention contre les ESD lors du retrait et remplacement des composants.

Pour prévenir les dommages dus aux ESD:

- Utilisez une sangle de poignet ou de cheville anti-ESD et assurez-vous qu'elle est en contact avec la peau. Branchez l'extrémité du cable de la sangle à une surface métallique non peinte du châssis et a la masse.
- Évitez de mettre en contact la carte de circuit imprimé ou les connecteurs avec vos vêtements. La sangle de poignet protège la carte ou connecteurs contre les ESD du corps seulement.
- Manipulez la carte uniquement par son support ou par ses bords. Évitez de toucher la carte de circuit imprimé ou les connecteurs.
- Ne posez la carte de circuit imprimé ou les connecteurs que sur une surface antistatique telle que le sac anti-statique fourni avec la carte.
- Si vous retournez la carte a Xilinx, remettez-la dans son sac antistatique immédiatement.

Vorsicht Elektrostatische Entladung

Elektrostatische Entladung (ESD) kann elektronische Bauteile beschädigen, wenn sie unsachgemäß behandelt werden, und es kann zu totalen oder zeitweiligen Ausfällen kommen. Befolgen sie beim Entfernen und Austauschen von Komponenten stets die ESD-Schutzmaßnahmen.

So verhindern sie ESD-Schäden:

- Verwenden sie einen ESD-Handgelenk-oder Knöchelriemen und stellen sie sicher, dass er Hautkontakt hat. Verbinden sie das Ende des Riemens mit einer unlackierten Metalloberfläche am Gehäuse.
- Berühren sie die Karte nicht mit ihrer Kleidung. Der Riemen schützt Komponenten nur vor ESD am Körper.
- Fassen sie die Karte nur an der Halterung oder an den Kanten an. Berühren sie nicht die Leiterplatte oder die Anschlüsse.
- Legen sie die Karte nur auf einer antistatischen Oberfläche ab, z.B. dem antistatischen Beutel der mit dem Kit mitgeliefert wurde.
- Wenn sie die Karte an den AMD Product Support zurücksenden, legen Sie sie bitte sofort wieder in den antistatischen Beutel.

Before You Begin

IMPORTANT! *AMD Alveo™ cards are delicate and sensitive electronic devices; equipment is to be installed by a qualified technician only. This equipment is intended for installation in a Restricted Access Location.*

IMPORTANT! *Les cartes AMD Alveo™ sont des appareils électronique sensibles et fragiles; l'équipement doit être installé par un technicien certifié seulement. Cet équipement est destiné à être installé dans un lieu d'accès restreint.*

WICHTIG! *Die Karten AMD Alveo™ sind sensible und empfindliche elektronische Geräte. Das Gerät darf nur von einem qualifizierten Techniker installiert werden. Dieses Gerät ist für die Installation an einem Ort mit begrenztem Zugang vorgesehen.*

- Verify that the minimum card space is available to install your card. Card specifications and dimensions can be found in the *Alveo UL3524 Ultra Low Latency Trading Data Sheet* (DS1009).
- Check for card compatibility with the system. Also check for proper system requirements such as power, bus type, and physical dimensions to support the card.
- Ensure that an appropriate PCIe auxiliary power source is available.

Installing the Card

The card supports both appliance and PCIe power modes:

- In appliance mode, all power is drawn from the PCIe 12V AUX power connector.

- In PCIe power mode, power is drawn from both the PCIe 12 AUX power connector and the PCIe 12V edge connector.

The following provides instructions for installing the card in these two modes.

Appliance Mode Installation

The following procedure is a guide for the Alveo UL3524 data center accelerator card installation operating in appliance mode.

1. If connected, disconnect the AUX cable from the Alveo card.
2. Plug the Alveo card into a mounting device.
3. Ensure the PCIe interface fingers are electrically isolated.
4. Connect the AUX power connector to the Alveo card, ensure the plug is mechanically fixed (with the click).

WARNING! *Do not power-on a passively cooled card without adequate forced airflow across the card with proper air flow direction, otherwise the card can be damaged. This card can heat up after use in the server. Use caution when handling. For more information, see UL3524 Ultra Low Latency Trading Data Sheet (DS1009).*

ATTENTION! *Ne mettez pas sous tension une carte refroidie passivement sans circulation d'air forcée adéquate sur la carteavec la bonne direction du flux d'air, sinon la carte peut être endommagée. Cette carte peut devenir chaude lors de son utilisation dansle serveur. Soyez prudent lors de la manipulation. Pour plus d'informations, se referrer a la fiche technique DS1009 de la carte UL3524 Ultra Low Latency Trading Data Sheet.*

WARNUNG! *Schalten Sie eine passiv gekühlte Karte nicht ein, ohne dass ein ausreichender erzwungener Luftstrom über die Karte mit der richtigen Luftstromrichtung erfolgt, da die Karte sonst beschädigt werden kann. Diese Karte kann sich nach Gebrauch im Server erhitzen. Seien Sie vorsichtig bei der Handhabung. Weitere Informationen finden Sie im Datenblatt der UL3524 Ultra Low Latency Trading Data Sheet (DS1009).*

***Note*:** This 8-pin connector is not compatible with an ATX12V/EPS12V power cable source. Ensure that the appropriate PCIe auxiliary power source is available, not an ATX12V/EPS12V power source. For more details see Answer Record 72298.

PCIe Power Mode

The following procedure is a guide for the AMD Alveo™ UL3524 data center accelerator card installation operating in PCIe power mode. Consult your computer documentation for additional information.

***Note*:** For use with UL Listed Servers or ITE.

1. Shut down the host computer and unplug the power cord.

2. Open your computer by removing the casing.
3. If necessary, remove the adjacent PCIe® slot cover corresponding to the PCIe slot in which you are installing the Alveo card.
4. Plug the Alveo card into the PCIe x16 slot on the motherboard.
5. Connect the AUX power connector to the Alveo card, ensure the plug is mechanically fixed (with the click).

   Note: This 8-pin connector is not compatible with an ATX12V/EPS12V power cable source. Ensure that the appropriate PCIe auxiliary power source is available, not an ATX12V/EPS12V power source. For more details see Answer Record 72298.
6. Re-install the computer casing.
7. Connect the power cord and turn on the computer.

WARNING! *Do not power-on a passively cooled card without adequate forced airflow across the card with proper air flow direction, otherwise the card can be damaged. This card can heat up after use in the server. Use caution when handling. For more information, see UL3524 Ultra Low Latency Trading Data Sheet (DS1009).*

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Running lspci

To verify that the device has been installed correctly, enter the following Linux command in the terminal:

```
$ lspci -vd 10ee:
```

If the card is successfully installed and found by the operating system, you will see a message similar to the following.

```
af:00.0 Processing accelerators: Xilinx Corporation Device 5098
  Subsystem: Xilinx Corporation Device 000e
  Flags: bus master, fast devsel, latency 0, NUMA node 1
  Memory at e2000000 (64-bit, prefetchable) [size=32M]
  Memory at e4000000 (64-bit, prefetchable) [size=256K]
  Capabilities: <access denied>
```

Appendix A

Additional Resources and Legal Notices

Finding Additional Documentation

Documentation Portal

The AMD Adaptive Computing Documentation Portal is an online tool that provides robust search and navigation for documentation using your web browser. To access the Documentation Portal, go to https://docs.xilinx.com.

Documentation Navigator

Documentation Navigator (DocNav) is an installed tool that provides access to AMD Adaptive Computing documents, videos, and support resources, which you can filter and search to find information. To open DocNav:

- From the AMD Vivado™ IDE, select **Help → Documentation and Tutorials**.
- On Windows, click the **Start** button and select **Xilinx Design Tools → DocNav**.
- At the Linux command prompt, enter `docnav`.

***Note*:** For more information on DocNav, refer to the *Documentation Navigator User Guide* (UG968).

Design Hubs

AMD Design Hubs provide links to documentation organized by design tasks and other topics, which you can use to learn key concepts and address frequently asked questions. To access the Design Hubs:

- In DocNav, click the **Design Hubs View** tab.
- Go to the Design Hubs web page.

Support Resources

For support resources such as Answers, Documentation, Downloads, and Forums, see Support.

References

These documents provide supplemental material useful with this guide:

1. *Alveo UL3524 Ultra Low Latency Trading Data Sheet* (DS1009)
2. Answer Record 72298
3. UL3524 Master Answer Record

Revision History

The following table shows the revision history for this document.

Section	Revision Summary
11/14/2023 Version 1.2.1	
General updates	Editorial updates only. No technical content changes.
09/27/2023 Version 1.2	
Initial public release.	N/A
01/27/2023 Version 1.1	
Minimum System Requirements	Removed duplicate note.
PCIe AUX Power	Added topic.
12/09/2022 Version 1.0	
AMD Confidential. Initial release under NDA only.	N/A

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