

Alveo V80 Data Center Accelerator Card

Installation Guide

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Introduction

The AMD Alveo™ V80 high-performance data center accelerator card is designed for deployment in any server on-prem or in the cloud and targets accelerating memory-bound, compute-intensive, high bandwidth workloads in:

- Genomic sequencing
- High-performance computing (HPC)
- Packet processing
- Big data analytics and search
- Financial computing
- Storage services

Featuring the powerful AMD Versal™ XCV80 HBM series adaptive SoC, the Alveo V80 card packs high bandwidth memory (HBM2e) and 800 Gb/s of high-speed networking into a full-height $\frac{3}{4}$ length form factor dual-slot card, and is designed for deployment in a server on-prem or in the cloud.

The V80 accelerator is optimized for maximizing I/O capabilities through the AMD Versal architecture. It features 32 GB of DDR4 DIMM memory tailored for use with compute fabric and DSP engines, supplemented by an additional 4 GB of discrete memory specifically crafted for Arm® cores on the Versal silicon. Additionally, the card offers Mini Cool Edge I/O (MCIO) expansion connectors targeting diverse applications (direct connection to NVMe storage) at PCI Express® Gen5 speeds. The V80 card supports PCIe Gen4 x16 or dual Gen5 x8, contains 32 GB of high-bandwidth memory (HBM2e) at 820 GB/s of bandwidth, and Ethernet networking capability with four QSFP56 connectors capable of 4 x 200 Gb/s. All this HBM2e bandwidth, power-optimized fabric performance, and capability are unlocked and available via the AMD Vivado™ Design Suite with a flow that is streamlined for hardware designers.

The following figure shows the Alveo V80 data center accelerator cards.

Figure 1: Alveo V80 Card



Accelerator Card Overview

Product Details

The following table provides high-level product details.

Table 1: Alveo V80 Card Product Details

Specification	V80
Product SKU	A-V80-P64G-ES3-G (with 32 GB DIMM) A-V80-P64G-PQ-G (with 32 GB DIMM) A-V80-P32G-PQ-G
Thermal design power (TDP) ¹	190W
Thermal cooling solution	Passive
Weight	958g
Form factor	Full-height, ¾ length, double-slot
PCIe physical	x16 PCIe
PCIe functionality support	PCIe Gen5 x8x8 or Gen4 x16
Network I/F	4x QSFP56 supporting 56G PAM4
Memory	<ul style="list-style-type: none"> 32 GB HBM2e @ 819 GB/s 4 GB @ 3200 MT/s, 64b + 8b ECC DDR4 288-pin DIMM socket
AUX power connectors	Two 8-pin PCIe AUX connectors
Expansion port	<ul style="list-style-type: none"> 2 x MCIO x4 1 x MCIO x8
Card management ²	Inband (over PCIe), out-of-band (over SMBus), management controller in adaptive SoC RPU
Power management ²	Power management with power management bus (PMBus) for voltage, current, and temperature monitoring including telemetry for major regulators
Manufacturing interface	ADK2 ³

Table 1: Alveo V80 Card Product Details (cont'd)

Specification	V80
Configuration option	<ul style="list-style-type: none"> • 2 Gb OSPI • JTAG over microUSB

Notes:

1. TDP is the maximum power consumption, in watts, the card can operate. Actual power consumption is dependent on the work load.
2. Card and power management features are delivered via the [Alveo Versal Example Design](#).
3. The Alveo debug kit (ADK2) connector is for manufacturing support only.

Minimum System Requirements

The minimum system requirements for running the Alveo V80 data center accelerator cards are listed in the following table.

Table 2: Minimum System Requirements

Component	Requirement
Motherboard	PCIe Gen5 compliant x16 slot double wide ¹
System Power Supply	PCIe 12V AUX power connector(s) and the PCIe edge connector

Notes:

1. Compatible with earlier PCIe systems at lower speeds.

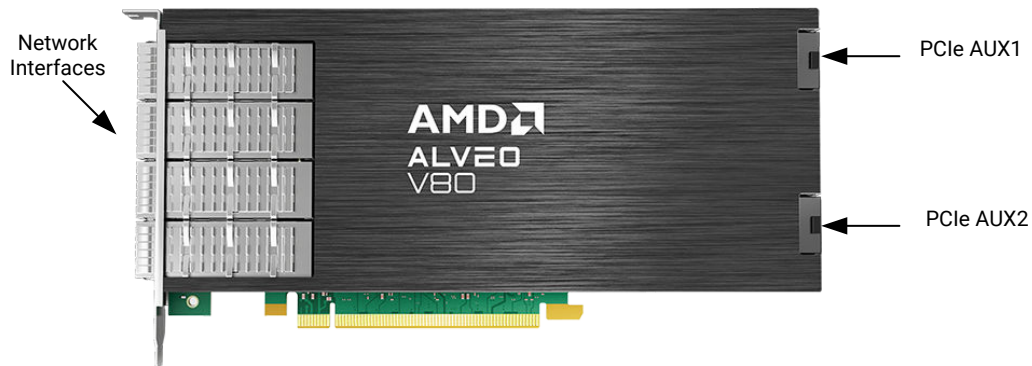
Card Interfaces and Details

The Alveo V80 data center accelerator card includes the following interfaces:

- A PCIe x16 connector
- Two PCIe AUX power connectors
- Four QSFP network interfaces supporting 56G PAM4
- ADK2

Note: The ADK2 is used for manufacturing only and is not shown in the following figure.

Figure 2: Alveo V80 Compute Adaptor



X28168-060123

Note: Alveo data center accelerator cards are designed to be installed into a data center server, where controlled air flow provides direct cooling.

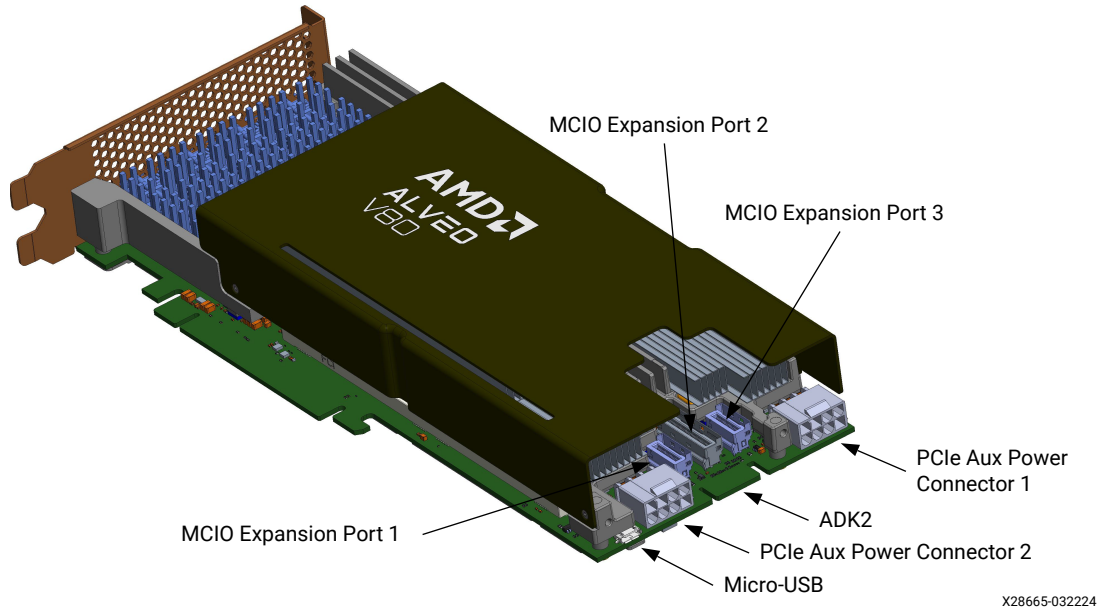
For card specifications, dimensions, list of card features, and block diagram, see the *Alveo V80 Data Center Accelerator Cards Data Sheet* ([DS1013](#)).

PCIe AUX Power

The Alveo V80 accelerator card has two 8-pin PCIe AUX power connectors, AUX1 and AUX2, that each provide 150W additional power. While the card will operate without either AUX power connected, power to the QSFP cages, DDR, and DIMMs requires at least one AUX cable to be connected. The location of the PCIe AUX power connectors is shown in the following figure.

Note: The PCIe AUX 8-pin connector is not compatible with an ATX12V/EPs12V power cable source. Ensure that the appropriate PCIe auxiliary power source is available, and not an ATX12V/EPs12V power source. For more details, see [Answer Record 72298](#).

Figure 3: AUX Power Connector Locations



The following table shows the maximum power available with and without AUX 2x4 power cables connected. At a minimum, the 75W PCIe slot power is always used.

Table 3: Power Availability

AUX Power Configuration	Maximum Power Available AUX 2x4
No AUX power cable connected ¹	75W
Two AUX power cables connected	300W ²

Notes:

1. QSFP cages, DDR, and DIMMs are not powered.
2. Maximum card power is limited by the TDP given in [Table 1](#).

Card Installation Procedures

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 Öffnen 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 câble de la sangle à une surface métallique non peinte du châssis et à 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 à AMD, 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 are described in *Alveo V80 Data Center Accelerator Cards Data Sheet (DS1013)*.
- Check for card compatibility with the system. Also check for proper system requirements such as power, bus type, airflow, and physical dimensions to support the card.

Installing the Card

The following procedure is a guide for the Alveo V80 data center accelerator card installation. Consult your server documentation for additional information.

Note: For use with UL Listed Servers or ITE.



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 overheat after use in the server, with default fan settings resulting in the card not being available on `lspci`. It is recommended that the fan speed is set to maximum before installing the card for the first time for sufficient cooling. Use caution when handling. For more information, see [Alveo V80 Data Center Accelerator Cards Data Sheet \(DS1013\)](#).

1. Shut down the host server and unplug the power cord.
2. Open your server 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. The V80 is a double-slot wide card.
5. Connect two PCIe AUX power cables to the Alveo card PCIe AUX power connectors AUX1 and AUX2, ensure the plug is mechanically fixed (with the click).

Note: The PCIe AUX 8-pin connector is not compatible with an ATX12V/EPS12V power cable source. Ensure that the appropriate PCIe auxiliary power source is available, and not an ATX12V/EPS12V power source. For more details, see AMD [Answer Record 72298](#).



IMPORTANT! Operation of the AMD Alveo™ card only with AUX power connectors is not allowed.

6. Re-install the server casing.
7. Connect the power cord and turn on the server.

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 5084
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>
```

See [Alveo Cards GitHub Documentation](#) for more information.

Additional Resources and Legal Notices

Finding Additional Documentation

Technical Information Portal

The AMD Technical Information Portal is an online tool that provides robust search and navigation for documentation using your web browser. To access the Technical Information Portal, go to <https://docs.amd.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

1. [Alveo V80 Data Center Accelerator Cards Data Sheet \(DS1013\)](#)
 2. [Answer Record 72298](#)
 3. [Alveo Cards GitHub Documentation](#)
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Revision History

The following table shows the revision history for this document.

Section	Revision Summary
05/08/2024 Version 1.0	
Initial release.	N/A

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