



AXELERA
ARTIFICIAL INTELLIGENCE

Metis PCIe 1-AIPU AI Accelerator Card Datasheet

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Document revision history

Revision	Date	Description
1 - PRELIMINARY	2024-10-31	First Issue
2 - PRELIMINARY	2024-12-18	Updated for compliance with Low Voltage Directive 2014/35/EU.
3 - PRELIMINARY	2025-01-30	Minor non-technical updates to text to reflect product name.
4 - PRELIMINARY	2025-01-30	Corrected broken link.
5	2025-03-24	Minor text updates and technical corrections.
6	2025-06-10	Added Part Number for 16 GB of RAM
7	2025-04-17	Updated information on supplied bracket in section 2.2 Updated Part Numbers in section 7

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1 Introduction

The Metis PCIe 1-AIPU AI Accelerator Card is an advanced AI processing module designed for edge systems requiring high performance with low power consumption.

This datasheet provides instructions and safety information to ensure the Metis PCIe 1-AIPU Accelerator Card module can be installed, operated, stored, maintained, repaired, and disposed of safely.

1.1 Metis PCIe 1-AIPU AI Accelerator Card overview

The Metis PCIe 1-AIPU AI Accelerator Card, (also known as: *Metis PCIe 1-AIPU card*) has a single Axelera AI Metis AIPU (AI processing unit) chip and can deliver up to 214 TOPS. It is designed to provide a significant boost for Gen AI and computer vision applications system operating on a PCIe bus. Its performance is enhanced through the Voyager SDK software stack to accelerate application deployment.



Figure 1: Axelera AI Metis PCIe 1-AIPU AI Accelerator Card module

1.2 Key features

- The highest-performance AI accelerator PCIe card on the market for edge AI applications. Powered by a single Metis AIPU.
- A single board can run inference on dozens of cameras as well as support multiple parallel neural networks.
- A wide range of end-to-end AI pipelines and models are available out of the box.
- Hassle-free evaluation and SW integration thanks to [Axelera AI Voyager SDK](#).
- Uncompromised prediction accuracy thanks to advanced quantization tools.

2 Specifications

2.1 Board and product characteristics

The tables in this section list the board characteristics, including physical and software characteristics.

Table 1: Metis M.2 board characteristics and properties

Specification	Description
Product name	Metis PCIe 1-AIPU AI Accelerator Card
Main chip	Axelera AI Metis AIPU (AI Processing Unit)
Memory	See section 7 Model/Part numbers
Thermal solution	Active fan
Host interface	PCIe Gen. 3.0, 4-lanes Bandwidth: Up to 4 GB/s.
Certification	CE, FCC, UKCA, ROHS

Table 2: Physical characteristics

Specification	Description
Mechanical form factor	PCIe half-height, half-length, single slot (HH, HL, SS)
Dimensions	Total length: 155.84 mm. See section 2.2. <i>Board mechanical details</i> .
Weight	500 grams
Power Rating	The Metis PCIe 1-AIPU board requires a PCI-SIG compliant power slot. A 25 W slot is the minimum required; 75 W is recommended.
Thermal Design Power	19 W
Typical Power	8 - 15 W Typical average power of Metis when running Deep Neural Networks at maximum performance at an ambient temperature of 25°C.

Table 3: Environmental characteristics

Specification	Description
Standard operating temperature (ambient)	-20~70°C
Storage temperature	-40~85°C
Storage humidity	0%~85% RH, non-condensing

2.2 Board mechanical details

This section provides the package information of the Metis PCIe 1-AIPU card. Figure 2 shows the card with its fan-based cooler.

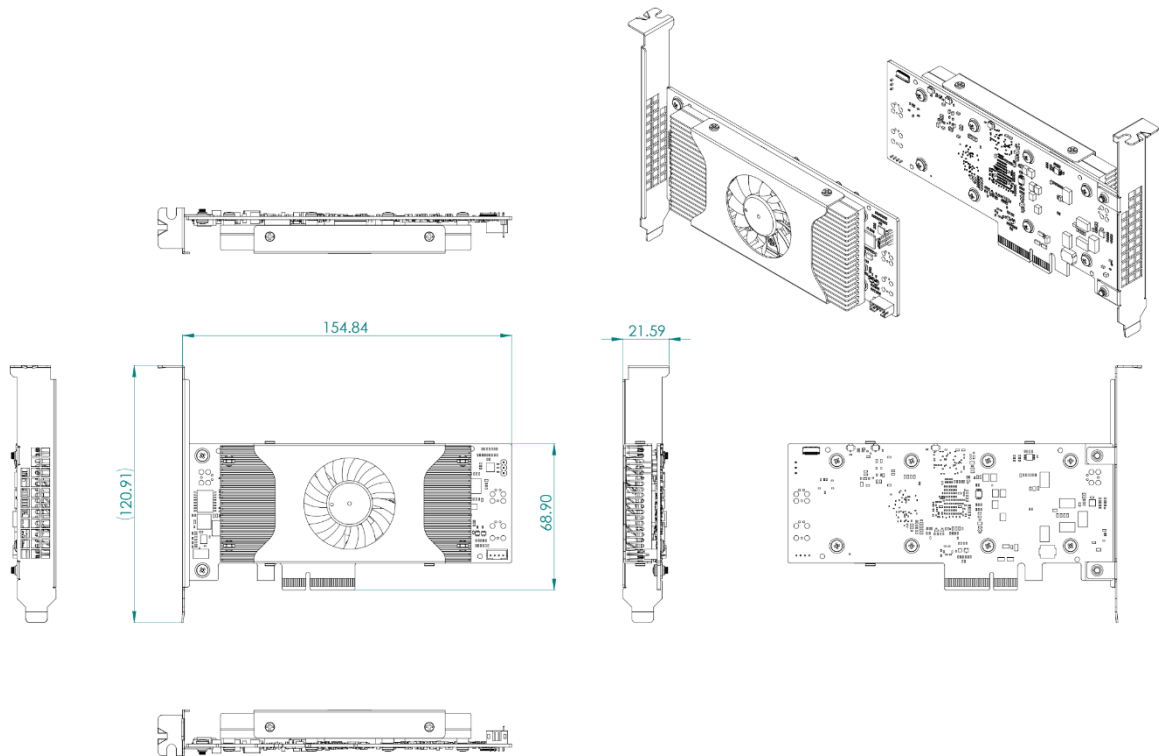


Figure 2: Metis PCIe 1-AIPU card package diagram showing fan-based cooler

Table 4 gives the package mechanical dimensions of the Metis PCIe 1-AIPU card cooled by the fan.

Table 4: Metis PCIe 1-AIPU card dimensions for the fan-cooled version

Item	Dimensions (mm)
Total length	155.84
Width (front)	120.91
Width (PCB + connector)	68.90
Total height	21.59
Board thickness	1.6

NOTE: Figure 2 and Table 4 show a version of the board with a bracket width of 120.91 mm. Metis 1-chip PCIe card is delivered with a standard (full height) bracket affixed. The product shipment also includes 1× spare low profile (half height) bracket.

2.3 Connector pinout

Table 5 shows the connector pinout for the Metis PCIe 1-AIPU card alongside signals from the Metis AIPU chip.

Table 5: Metis PCIe 1-AIPU card connector pinout and signals

Pin name	Pin reference	Signal name (other side)
12V_1	B1	12V Power
12V_2	B2	12V Power
12V_3	B3	12V Power
12V_4	A2	12V Power
12V_5	A3	12V Power
3.3VAUX	B10	3.3V Auxiliary Power
3.3V_1	B8	3.3V Power
3.3V_2	A9	3.3V Power
3.3V_3	A10	3.3V Power
GND_1	B4	Ground
GND_4	B13	Ground
GND_5	B16	Ground
GND_6	B18	Ground
GND_7	A12	Ground
GND_8	A15	Ground
GND_9	A18	Ground
GND_10	B21	Ground
GND_11	B22	Ground
GND_12	B25	Ground
GND_13	B26	Ground
GND_14	B29	Ground
GND_15	B32	Ground
GND_16	A20	Ground
GND_17	A23	Ground
GND_18	A24	Ground
GND_19	A27	Ground
GND_2	B7	Ground
GND_20	A28	Ground
GND_21	A31	Ground
GND_3	A4	Ground

Pin name	Pin reference	Signal name (other side)
PERn0	A17	PCIE RX Negative (Lane 0)
PERn1	A22	PCIE RX Negative (Lane 1)
PERn2	A26	PCIE RX Negative (Lane 2)
PERn3	A30	PCIE RX Negative (Lane 3)
PERp0	A16	PCIE RX Positive (Lane 0)
PERp1	A21	PCIE RX Positive (Lane 1)
PERp2	A25	PCIE RX Positive (Lane 2)
PERp3	A29	PCIE RX Positive (Lane 3)
PETn0	B15	PCIE TX Negative (Lane 0)
PETn1	B20	PCIE TX Negative (Lane 1)
PETn2	B24	PCIE TX Negative (Lane 2)
PETn3	B28	PCIE TX Negative (Lane 3)
PETp0	B14	PCIE TX Positive (Lane 0)
PETp1	B19	PCIE TX Positive (Lane 1)
PETp2	B23	PCIE TX Positive (Lane 2)
PETp3	B27	PCIE TX Positive (Lane 3)
REFCLK+	A13	Reference Clock Positive
REFCLK-	A14	Reference Clock Negative
PERST#	A11	Reset
PRSNT1#	A1	PERST Presence Detect 1
PRSNT2#_2	B31	PERST Presence Detect 2 (Part 2)

2.4 Cooling solution

The Metis PCIe 1-AIPU card uses a fan-based cooler, the fan dissipates hot air on either side of the heatsink. Figure 3 shows the airflow directions: the blue arrow indicates cold air, the red indicates hot air.



Figure 3: Air flow directions for the Metis PCIe 1-AIPU card with a fan-based cooler.

The fan characteristics are shown in Table 6.

Table 6: Metis PCIe 1-AIPU card's fan characteristics

Item	Dimensions (mm)
Fan dimensions	50x50x10mm
Voltage	11.4 V - 12.6 V
Power consumption	3W at 100% duty cycle
Speed	5,500 RPM \pm 15% at 100% duty cycle
Max. air flow	10 CFM at 100% duty cycle
Air pressure	2.49 mm H ₂ O

2.5 Security

The Metis AIPU chip features a Root of Trust (RoT) that can be securely provisioned during chipset manufacturing. Secure Boot and other security features built on this foundational RoT will be enabled in future revisions. For more information, please see Axelera contact details in section 6 Support.

3 Safety information

Before installing the Metis PCIe 1-AIPU AI Accelerator Card and to ensure its safe use, follow these guidelines:

- **General handling:**
 - Handle the card with care to avoid physical damage.
 - Wear an anti-static wrist strap during installation to prevent electrostatic discharge (ESD).
 - Disconnect the power source before handling, installing, or maintaining the product.
- **Installation:**
 - Ensure the card is installed in a PCIe-compliant slot.
 - Verify that the power source complies with the product's power requirements (75 W recommended).
- **Operation:**
 - Do not block the airflow to the fan or heatsink during operation.
 - Monitor system temperatures regularly to prevent overheating.
 - Operate only within the specified ambient temperature range (-20°C to 70°C).
- **Storage:**
 - Store the product in a dry environment within -40°C to 85°C and 0%-85% relative humidity (non-condensing).
- **Maintenance:**
 - Regularly clean the fan and heatsink to prevent dust buildup.
 - Ensure software and firmware are updated to maintain performance and security.
 - Inspect the card and connectors periodically for signs of wear or damage.
- **Disposal:**
 - Dispose of the product in accordance with local electronic waste regulations.

WARNING: Improper handling, installation, or use may result in injury, equipment damage, or voiding of warranty.

4 Installation instructions

1. **Card installation:**
 - Align the card with the chosen PCIe Gen. 3.0 x4 slot in your system slot and gently insert it.
 - Secure the card using the bracket screws.
2. **Cooling verification:**
 - Ensure the fan is securely attached and unobstructed.
 - Verify airflow in the system chassis.
3. **Power connection:**
 - Confirm that your system provides sufficient power directly through the PCIe slot.
4. **Software Setup:**
 - Install the Voyager SDK for model configuration and optimization.

5 Troubleshooting

Issue: The system does not detect the card.

Solution:

1. Verify the card is properly seated in the PCIe slot.
2. Check the system's BIOS/UEFI to confirm PCIe lane availability.

Issue: Overheating during operation.

Solution:

1. Ensure adequate airflow within the chassis.
2. Clean the fan and verify its operation.

6 Support

For further information and support please visit:

- Axelera AI Community: <https://community.axelera.ai/>
- Axelera AI Customer Portal: <https://support.axelera.ai>

7 Model/Part numbers

The Metis PCIe 1-AIPU AI Accelerator Card is available in the variants listed in Table 7.

Table 7: Metis PCIe 1-AIPU AI Accelerator Card part numbers

Part number	Description
AXE-BME20P1AJ04A02	(End of sale¹) Metis AI Accelerator PCIe Card, 1-AIPU, 4 GB, active cooling, Rev1.1
AXE-BME20P1AE16A02	Metis AI Accelerator PCIe Card, 1-AIPU, 16 GB, active cooling, Rev1.1
AXE-BME21P1BH02A03	Metis AI Accelerator PCIe Card, 1-AIPU, 2 GB, active cooling, Rev2.0
AXE-BME21P1BI08A03	Metis AI Accelerator PCIe Card, 1-AIPU, 8 GB, active cooling, Rev2.0

Other memory variants are available upon demand, subject to minimum order quantities.

¹ This part is no longer available for purchase. Existing customers continue to receive full software and hardware support.

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