

Article Overview

AI servers can be disassembled into five main hardware sections: front fan module, drives and front control board, GPU board assembly, CPU motherboard assembly, and power modules, each with specialized PCBs and design considerations.

Core Hardware Sections

- o **Front Fan Module** The front of an AI server typically houses a fan module with multiple fans (e.g., eight in an 8U NVIDIA DGX A100), designed for high airflow to cool densely packed components .
- o **Drives and Front Control Board** Below the fan module are storage drives and a front control board. For example, the DGX A100 integrates eight 3.84 TB drives totaling 30 TB, managed by a control board responsible for system oversight and external device signaling .
- o **GPU Board Assembly (GPU Board Tray)** This is the defining section of an AI server. It contains the GPUs, module boards, and NVSwitch units. Each GPU uses advanced FCBGA substrates (14-16 layers, 70x70 mm to 100x100 mm) for 2.5D/3D packaging, and NVSwitch modules enable high-bandwidth GPU communication . The OCP Accelerator Module (OAM) hosts the GPU chip, acting as the GPU accelerator card itself. This section is the most computationally intensive and valuable in terms of PCB content .
- o **CPU Motherboard Assembly (CPU Motherboard Tray)** This section includes the CPU motherboard, system memory, network adapters, and PCIe switches. High-speed signal transmission and power distribution are critical here, with thick copper layers and specialized dielectric materials used to reduce signal loss and ensure stable operation .
- o **Power Modules** AI servers like the DGX A100 include multiple power supply units (e.g., six units) at the rear lower section. Modern AI servers increasingly adopt high-voltage systems (48V or 800V) and resonant circuits for efficient power conversion, requiring large numbers of MLCCs and other passive components .

PCB Design Considerations

- o **Heat Dissipation:** Multi-layer PCBs use embedded copper blocks to conduct heat from chips to edge heat sinks, improving efficiency over surface-only dissipation .
- o **Signal Integrity:** High-frequency boards use specialized dielectric materials to minimize signal loss, ensuring reliable high-speed data transfer .
- o **Power Distribution:** Thick copper foils and carefully designed power layers handle high instantaneous currents from AI chips, maintaining system stability .
- o **Component Value:** GPU substrates and NVSwitch carriers are high-value PCBs, with GPU substrates estimated at around \$100 each and NVSwitch carriers around \$30 each .

Safety and Best Practices

Disassembling AI servers requires careful handling of sensitive components, including GPUs, memory

Disassembling the AI Server

modules, and high-voltage power supplies. Anti-static precautions, proper tools, and documentation of connections are essential to avoid damage. Understanding the layout and function of each section helps in maintenance, upgrades, or educational teardown exercises. By following this structured approach, one can safely explore the internal architecture of AI servers and gain insight into the specialized PCB designs that enable high-performance AI workloads.

AI servers are high-performance systems specifically designed to process complex AI workloads, including model training and real

This article will introduce you to the core concepts of AI servers, their architecture, and functionality.

Learn what AI servers are and how they power artificial intelligence. Complete guide to AI server components,

GAIA is AMD's open-source framework for building intelligent AI agents that run 100% locally on AMD Ryzen AI hardware. Keep your

The mechanical process of disassembling - purely decoding instructions - stays the same; there is nothing there that

Step inside the heart of modern artificial intelligence with this stunning 4K Ultra HD teardown of an AI supercomputer

The emerging 48V AI servers demand significantly more power, both in peak and steady states, than traditional servers. The high

Smart NAS with local LLM, semantic photo search, and OCR. 6-bay storage, 8K HDMI, save up to \$1040 on pre-order.

Understanding those differences is essential for anyone involved in designing, manufacturing, or procuring the printed circuit boards

AI servers and AI workstations are commonly confused with one another. Learn about key differences between the two

NVIDIA GH200 AI Server Main Boards features, dismantling, internal and block diagram images, parts

The leading AI Engine on the edge now open source on GitHub Our team at DeepQuest AI is glad to announce that

Our circular manufacturing technology makes it possible to transform your existing product line or develop your next generation of

A new UN report finds that more and more electronic waste, or e-waste, is being produced

Keywords robotic disassembly, AI approaches, human robot collaboration, computer vision, systematic review Citation

Hier sollte eine Beschreibung angezeigt werden, diese Seite lässt dies jedoch nicht zu.

Web: <https://supremeacademicresearch.co.za>

