

AI Server Structure Design Diagram



AI Overview

An AI server structure integrates high-performance GPUs, CPUs, memory, storage, networking, and power distribution into a cohesive system optimized for AI workloads.

Core Components of an AI Server

Compute Layer: AI servers rely heavily on GPUs or AI accelerators for parallel processing, while CPUs handle general-purpose tasks and orchestration. High-speed interconnects like NVLink or PCIe connect GPUs to CPUs and memory, enabling rapid data transfer for AI model training and inference . **Memory and Storage:** AI servers use high-bandwidth memory (HBM) and large RAM capacities to feed GPUs efficiently. Storage includes ultra-fast SSDs or NVMe drives, often organized in RAID configurations for redundancy and speed . **Networking:** Specialized networking hardware ensures low-latency, high-throughput communication between servers in a cluster. This is critical for distributed AI workloads and real-time analytics . **Power Distribution:** AI servers require robust power management. Onsemi's AI data center design illustrates AC-DC conversion, DC-DC distribution, smart power stages, and PoL buck converters, achieving high efficiency (up to 98%) and supporting high-density GPU clusters . **PCB and Hardware Layout:** The internal structure includes multiple PCB layers:

- **GPU Board Assembly:** Houses GPUs, NVSwitch units, and accelerator modules (OAMs), often with 14-20 PCB layers for high-speed signal integrity .
- **CPU Motherboard Tray:** Contains CPUs, system memory, network adapters, and PCIe switches....

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The diagram illustrates both AC-DC conversion and DC-DC power distribution stages utilized in AI data centers. onsemi's integrated

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