



REBEL-Quad

Scaling Frontier LLMs
with UCle-Advanced & HBM3E

- Built to serve frontier LLMs with high utilization and low power.
- Powered by unified mixed-precision cores, responsive DMA scheduling, and UCle interconnect.
- Rack-scale performance. Modular flexibility. Ready for deployment.

REBEL-Quad is the world's first UCle-Advanced AI accelerator card—engineered for efficient, scalable inference and seamless deployment at hyperscale. At its core is a modular SoC that fuses four identical compute chiplets into a monolithic-acting unit via high-bandwidth UCle-Advanced links, enabling seamless scaling from single-node to multi-rack clusters.

Accelerator Card Specifications

Architecture		Host Connection
Compute (Dense)	4-homogeneous-chiplet SoC based on UCle-Advanced	2x (64GB/s + 64GB/s); 2x PCIe Gen5 x16
	1,024 TFLOPS (FP16) 2,048 TFLOPS (FP8)	Power Consumption
		Up to 600W
External Memory	HBM3E 144GB 4.8TB/s	Software
Chiplet (UCle-A) Interconnection	16Gbps 1TB/s per channel	Native-support of PyTorch 2.x, vLLM and Triton

SoC Architectural Pillars



Unified Compute Engine: One Core for All Precisions

A mixed-precision core with per-operand flexibility supports FP8 and FP16 in a unified pipeline—eliminating instruction switching and boosting compute density by 2.8× and utilization by 16% on ATOM™.



Responsive DMA Scheduling: Memory Access Without Waiting

A pre-compiled DMA engine orchestrates KV cache access with command-level bandwidth and QoS control, delivering 3.3× higher per-core bandwidth—keeping 32K-token decoding smooth.



Modular UCle Interconnect: Multiple Dies as One

Four chiplets are unified via 1TB/s per-channel UCle-Advanced links into a single system. The same interconnect extends off-chip, enabling rack-scale disaggregation.



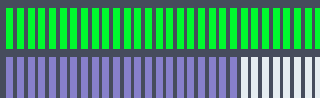
Holistic Synchronization: Perfect Orchestration for Peta-Scale Workloads

A hardware-accelerated sync fabric coordinates execution across chiplets, including sparse and MoE models. It enables fine-grained parallelism and eliminates stalls during expert routing.

REBEL-Quad vs. B200 SXM (Llama 3.3 - 70B)

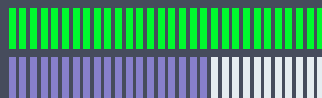
Throughput
(TPS)

~x1.4



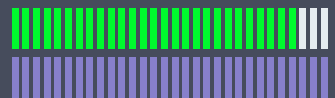
Efficiency
(TPS/Watt)

~x1.6



Power consumption
(Watt)

~x0.9



REBEL-Quad redefines the economics of AI infrastructure –from silicon to system scale.

In internal evaluations, REBEL-Quad has demonstrated higher throughput than NVIDIA B200-class GPUs on large-scale LLMs—resolving both compute and memory bottlenecks in a single, modular system.

Looking ahead, future REBEL chiplets including I/O dies, are already in development, designed to extend this platform for trillion-parameter models and multi-node exascale deployments.