STAR LAKE

RK7000

42U-50kW-80GPU Field Ready Modular Data Center

- 42U Ruggedized Rack with 50 kW Density
- High Density Compute Up to 80 GPU Per Rack
- Liquid Cooling Cold Plate Up to 15kW Per Server
- Integrated 150 kW CDU & 5kW UPS
- Quick-Disconnect Liquid Manifolds
- Plug-and-Play Tactical Deployable, Logistically Sustainable
- Intel 6th Xeon-SP Up to 144 Cores, Nvidia GPU up to 350W
- Dimensions: 23.62 In (W) x 79.21 In (H) x 47.24 In (D)
- MIL-STD-810 for Extreme temperature, Vibration and Shock

System Overview — Configuration at a Glance

Specification	Description
Rack Form Factor	42U Ruggedized AI Rack | Heavy-duty welded steel chassis Dimensions: 23.62 In (W) x 79.21 In (H) x 47.24 In (D)
Target IT Power Density	Up to 50 kW per rack (IT load)
Cooling Architecture	Conduction-over-liquid / Direct-to-Chip (DTC) liquid cooling | CDU + CDM + Cold Plate
GPU Compute Platform	7STARLAKE AV2000 3U GPU Server
Processor Platform	Dual Intel® Xeon® 6 6760P (Granite Rapids SP)
GPU Accelerator	NVIDIA RTX PRO™ 6000 Blackwell
Maximum GPU Server Count	Up to 10 × 3U AV2000 GPU Servers per rack
Switching Fabric	2 × SN3420-D22 | 48-port 25GbE + 8-port 100GbE | Dual-redundant AI fabric
Storage Platform	ROC540 NAS | 1,120 TB raw capacity | 3U form factor
Cooling Distribution Unit	50 kW Ruggedized CDU | 4U | N+1 redundant pumps | Hot-swappable PSU
Integrated UPS	4U Industrial UPS | Generator-compatible | Surge protection and ride-through
Deployment Profile	Mobile / Tactical / Edge Modular Data Center | Rapid deployment architecture

42U Ruggedized Rack Configuration

The following table details the standard integrated rack configuration. The RK4000 is shipped as a fully assembled, rack-validated solution with all components pre-installed, cabled, and liquid cooling circuits pre-charged and pressure-tested prior to delivery.

Component	Model	Rack U	Qty	Description
GPU Compute Server	AV2000	3U	**× 9**	Liquid-cooled AI GPU server; Conduction-Over-Liquid-Cooling; 4–5 kW per node
Network Switch	SN3420-D22	2U	**× 2**	100G AI fabric switch; 48 × 25GbE + 8 × 100GbE QSFP28; dual-redundant configuration
NAS Storage	ROC540	3U	**× 1**	1,120 TB raw NAS; AI dataset repository; high-throughput NVMe-backed storage
Cooling Distribution Unit	50 kW Ruggedized CDU	4U	**× 1**	Liquid-to-liquid heat exchange; N+1 pump redundancy; QDC manifold connections; hot-swappable
Integrated UPS	Industrial UPS	4U	**× 1**	Backup power and surge protection; generator-compatible; field-deployable ruggedized
Coolant Distribution Manifold	Vertical CDM	Integrated	**× 1**	Vertical CDM with QDC connections per rack bay; optimized coolant flow distribution to all compute nodes

AV2000 GPU Compute Server Specifications

7STARLAKE AV2000 | 3U Liquid-Cooled AI GPU Server

The AV2000 is the primary AI compute node within the RK4000 rack ecosystem. Each 3U server is equipped with dual Intel® Xeon® 6 Scalable Processors and an NVIDIA RTX PRO™ 6000 Blackwell GPU accelerator, interconnected via PCIe Gen 5 for maximum GPU-CPU bandwidth. The conduction-over-liquid cooling system transfers heat directly from the CPU cold plates, GPU cold plate, and DIMM thermal modules to the rack CDU loop — eliminating hot spots and enabling sustained full-performance operation regardless of ambient conditions.

Item	Specification
Model	7STARLAKE AV2000
Form Factor	3U Rackmount | Tool-less rail-mount slide
Processor	Dual Intel® Xeon® 6 6760P | Granite Rapids SP | PCIe Gen 5 | DDR5-6400
Core / Thread Count	Up to 144 Cores / 288 Threads (dual socket)
Memory	DDR5-6400 RDIMM ECC | Up to 8 TB addressable system memory
GPU Accelerator	NVIDIA RTX PRO™ 6000 Blackwell | PCIe Gen 5 x16 | 96 GB GDDR7
Storage Interface	U.2 PCIe Gen 5.0 × 4 NVMe | MCIO × 8 breakout to dual SFF-8639 (85-ohm)
Networking	Dual 100GbE QSFP28 (NVIDIA ConnectX or equivalent) | 1GbE OOB management
Cooling Method	Conduction-over-liquid Direct-to-Chip (DTC) | CPU cold plate + GPU cold plate + DIMM thermal module
Estimated Node Power	4–5 kW per server (sustained AI compute load)
Coolant Interface	Quick-Disconnect Couplings (QDC) | Integrates with rack vertical CDM
Deployment Use Case	AI training / AI inference / HPC / real-time ISR processing

50 kW Ruggedized CDU Specifications

Cooling Distribution Unit | 4U Form Factor

The integrated Cooling Distribution Unit (CDU) is the thermal heart of the RK4000 liquid cooling infrastructure. It circulates chilled coolant to each server's cold plate assembly, collects heated return coolant, and transfers the thermal load to the facility water supply or an external dry cooler / cooling tower. The CDU is engineered for uninterrupted operation in field environments, incorporating N+1 pump redundancy, automatic anti-condensation control, and hot-swappable components to enable maintenance without system shutdown.

Item	Specification
Form Factor	4U Rackmount | Integrated within RK4000 chassis
Cooling Capacity	50 kW (rated) | Scalable with external CDU for expanded rack deployments
Cooling Type	Liquid-to-liquid heat exchange | Primary loop: internal rack coolant | Secondary loop: facility water
Maximum Facility Water Inlet Temperature	Up to 45°C — reducing dependency on chilled facility water
Pump Configuration	N+1 redundant pumps | Hot-swap replacement in under 2 minutes
PSU Configuration	Redundant hot-swappable PSUs | Field-replaceable in under 1 minute
Coolant Interface	Quick-Disconnect Couplings (QDC) at rack manifold | 1.25-inch hose kit connections
Manifold Type	Vertical Coolant Distribution Manifold (CDM) with per-bay QDC | One-handed coupling operation
Leak Detection	Integrated liquid level and air pressure sensors | Sight glass for visual inspection
Anti-Condensation	Automatic condensation prevention control — no manual intervention required
Redundancy Mode	Supports N+1 CDU configuration across multiple rack deployments

Management	Local LCD touch panel | Remote access via network management interface
Deployment	Ruggedized tactical field operation | Generator-compatible | Designed for sustained unprepared-site deployment

Integrated UPS Specifications

Item	Specification
Form Factor	4U Industrial-Grade Rackmount UPS
UPS Topology	Online double-conversion | Sub-10 ms transfer time on generator switching event
Function	Backup power ride-through | Transient suppression | Surge protection
Input Compatibility	Utility / Generator-compatible | Wide input voltage and frequency acceptance
Generator Interface	MEP-series military generator compatible | Tolerant of generator-grade power quality
Battery Chemistry	Industrial-grade sealed VRLA or LiFePO4 (configuration-dependent)
Deployment	Field-deployable ruggedized operation | Designed for mobile and tactical environments

Conduction-Over-Liquid Cooling Architecture

The RK4000 integrates a fully closed-loop Conduction-Over-Liquid-Cooled, Direct-to-Chip (DTC) liquid cooling architecture that captures heat at the source — CPU die, GPU die, and DIMM modules — eliminating the thermal resistance of conventional air-cooled heat sinks and enabling sustained operation at rack densities that air cooling cannot support. The architecture mirrors proven commercial hyperscale liquid cooling topologies (including Supermicro's 42U rack-scale DTC solution validated at ISC 2024) while incorporating ruggedized components and manifold interfaces rated for tactical field environments.

Component	Technology	Key Characteristics
CPU Cold Plate	Micro-channel copper cold plate | Intel Xeon 6 SP socket interface	Lower thermal resistance than industry-standard heat sink specifications; micro-sized channels for high heat flux dissipation
GPU Cold Plate	GPU-specific cold plate | NVIDIA RTX PRO 6000 Blackwell form factor	Direct die-contact cooling; also captures heat from adjacent GPU power components and NVLink switch fabric
DIMM Thermal Module	DDR5 DIMM direct-contact thermal module	Reduces DIMM operating temperature; improves memory reliability and longevity under sustained high-bandwidth AI workloads
Coolant Distribution Manifold (CDM)	Vertical rack-mount CDM with per-bay QDC ports	Optimized flow distribution; one-handed QDC operation; liquid level and pressure sensors with sight glass; supports 42U rack configuration
Hose Kit / Facility Interface	1.25-inch flexible hose | Camlock QDC facility connection	10-bar pressure rated; ball valve sealing; universal camlock for direct facility water or cooling tower connection; 1 m / 2 m / 3 m / 5 m lengths available

Cooling Distribution Unit (CDU)	50 kW liquid-to-liquid heat exchanger | 4U integrated	N+1 pumps; 45°C max facility water; anti-condensation control; hot-swap pumps and PSUs; local and remote management

The closed-loop primary circuit maintains coolant isolation between the sensitive rack IT equipment and the facility water supply, preventing contamination and corrosion of server-side components. All primary-side components in contact with coolant are corrosion-resistant and rated for continuous operation with standard propylene glycol / water (PG/W) coolant mixes appropriate for tactical temperature ranges.

Switching & Network Fabric

SN3420-D22 | 2U 100G AI Fabric Switch

Item	Specification
Model	SN3420-D22
Form Factor	2U Rackmount
Port Configuration	48 × 25GbE SFP28 (server / storage downlinks) | 8 × 100GbE QSFP28 (uplinks / inter-switch)
Switching Capacity	3.2 Tbps non-blocking | RDMA / RoCEv2 support for GPU-to-GPU AI traffic
Configuration	Dual-switch deployment (2 × SN3420-D22) | Active-active redundant fabric
Management	In-band and out-of-band management | Industry-standard SNMP / REST API
Cooling	Integrated fan cooling | Front-to-rear airflow

Storage Platform

ROC540 | 3U High-Capacity NAS Server

Item	Specification
Model	ROC540
Form Factor	3U Rackmount
Raw Capacity	1,120 TB
Primary Use	AI dataset repository | Model checkpoint storage | ISR data archive
Interface	High-throughput NAS / NVMe-oF | 10GbE / 25GbE network connectivity
Redundancy	RAID-protected storage pools | Hot-spare drives

Deployment Applications

Mission-Critical Applications

- Tactical Edge AI Compute
- Autonomous Systems Processing
- Real-Time ISR Exploitation
- AI Inference and Training at the Edge
- High-Performance Computing (HPC)
- Mobile Command & Control Infrastructure

Platform Deployment Contexts

- Forward Operating Base (FOB) Compute Infrastructure
- Expeditionary Airfield Edge MDC
- Naval Vessel On-Board AI Processing
- Vehicle-Mounted High-Density Compute
- Rapid Deployment Mission System Integration
- Classified AI Workload Environments (accreditation pathway available)

System Management & Monitoring

The RK4000 provides a fully integrated hardware management stack covering both IT compute nodes and liquid cooling infrastructure from a single management interface:

Management Layer	Capability
Server BMC / iDRAC	Per-node out-of-band management; IPMI 2.0; Redfish API; power monitoring; remote KVM; hardware health alerting
CDU Management Interface	Real-time sensor telemetry: coolant pressure, flow rate, inlet/outlet temperature, pump status, leak detection; local touch panel + remote REST API access
Network Switch Management	In-band SNMP v3 / REST API; per-port traffic monitoring; VLAN configuration; flow control; RDMA queue management
Rack-Level Power Monitoring	Per-outlet metered PDU; aggregate rack power measurement; trending and alerting for anomalous power draw
UPS Monitoring	Battery state of health; runtime estimate; input/output voltage and frequency; transfer event logging
Integration API	RESTful Northbound API for integration with customer DCIM, SCADA, or mission management systems; supports up to 20,000 managed nodes at scale

Ordering Information

Item	Detail
Product Model	RK4000
Configuration	Fully integrated rack solution | Custom configurations available on request
Lead Time	Subject to order volume and configuration; contact sales for current lead time
NRE / Customization	Non-Recurring Engineering (NRE) available for MIL-STD power input variants, TEMPEST treatment, and SCRM-compliance documentation
Company	7STARLAKE CO., LTD.
Product Line	Edge MDC / Tactical AI Infrastructure
Documentation	Full ICD, mechanical drawings, and thermal validation reports available under NDA upon request