AI Workstation

Chassis Thermal Recommendation

ASRock AI Center
Allen Sun 2025-12-24

AMD Radeon™ AI PRO R9700

ASRock R9700 Creator 32GB Key Thermal Management Parameters	Technical Details
GPU Architecture	AMD RDNA 4 (Navi 48)
Total Board Power (TBP)	300 W
Cooler Type	Blower-style cooler with vapor chamber
Recommended PSU (Single GPU)	750 W
Physical Dimensions	271 × 112 × 39 mm (Dual-slot width)
Thermal Interface Material	Honeywell PTM7950 Phase-Change TIM

Fan Configuration: What Actually Works in Real-World Builds

1️⃣ 3 intake fans + 1 exhaust fan

You don't need a dozen fans—you just need the right airflow layout.

2️⃣ When GPU temperature is your top priority: use bottom intake

This setup is quieter and more stable than "front 3 + top 3 + rear 1"
Bottom intake requires dust filters and at least 2 cm of chassis clearance from the ground

3️⃣ When Using Liquid Cooling for the CPU

Radiator on top → top exhaust
Radiator in front → front intake (only if front airflow is adequate)

Case

Power Supply

CPU Cooling

Filter Criteria Summary (4-card configs)

Specifications	Note
Enhanced ATX Motherboard	Workstation boards (e.g., ASRock WRX90 WS EVO) required for 8+ PCIe slots to fit four dual-slot GPUs plus Threadripper power delivery.
Max GPU Length: 400mm+	R9700 is only 267-271mm. Extra space prevents fan conflicts, enables cable management for four 12V-2x6 connectors, and creates airflow buffer zones.
Bottom Dust Filters	Essential protection for 1800W+ system. Maintains positive pressure while preventing dust buildup in primary cooling path.
Bottom 3x 140mm Fans	Four cards = 1200W heat in tight spacing. 140mm fans deliver higher CFM, lower noise, and wider airflow coverage—critical for cooling the thermally-starved bottom GPU.

Preferred Chassis Solutions for the North American Market

Product Name & Key Features	Expansion Slots
Lian Li O11 Dynamic EVO XL 🔗 **Modular design with exceptional internal clearance:** Quick-release bottom fan bracket supports three 140mm fans. The motherboard tray offers three-level vertical adjustment—setting it to Upper Mode creates up to 90.5mm clearance between GPUs and bottom intake fans, ensuring adequate airflow to lower GPUs in 4-card configs.	8
Phanteks NV9 / NV9 MKI 🔗 **Optimized vertical airflow:** Elevated chassis floor maintains 65mm ground clearance, allowing three bottom 140mm fans unrestricted air intake. Integrated GPU support bracket reduces PCIe slot stress from four-GPU weight.	8

Preferred Chassis Solutions for the North American Market

Product Name & Key Features	Expansion Slots
Antec C8 🔗 **Dual-chamber isolation:** PSU and drive cages relocated to separate rear chamber, providing unobstructed intake for three bottom 140mm fans while isolating PSU heat from GPU airflow.	8
Cooler Master HAF70 🔗 **Extreme high airflow with tool-free installation:** PSU and drives in dedicated rear chamber remove obstructions beneath lowest GPU, enabling three bottom 140mm fans to generate clean vertical airflow directly into the GPU array.	8
Fractal Design Torrent 🔗 **Used in ASRock AI Center demonstration system**	7

Dual-GPU System Selection Criteria

The chassis selection criteria for dual-GPU systems are largely identical to those for four-GPU configurations, with the following adjustments:

- Motherboard form factor requirement is reduced to ATX
- Expansion Slots requirement is reduced to 4

All other considerations — including bottom intake capability, unobstructed vertical airflow, GPU-to-fan clearance, and long-term thermal stability under sustained high-load operation — remain unchanged.

The ASRock AI Center demonstration system is built using the darkFlash DY470 🔗 chassis.

Case

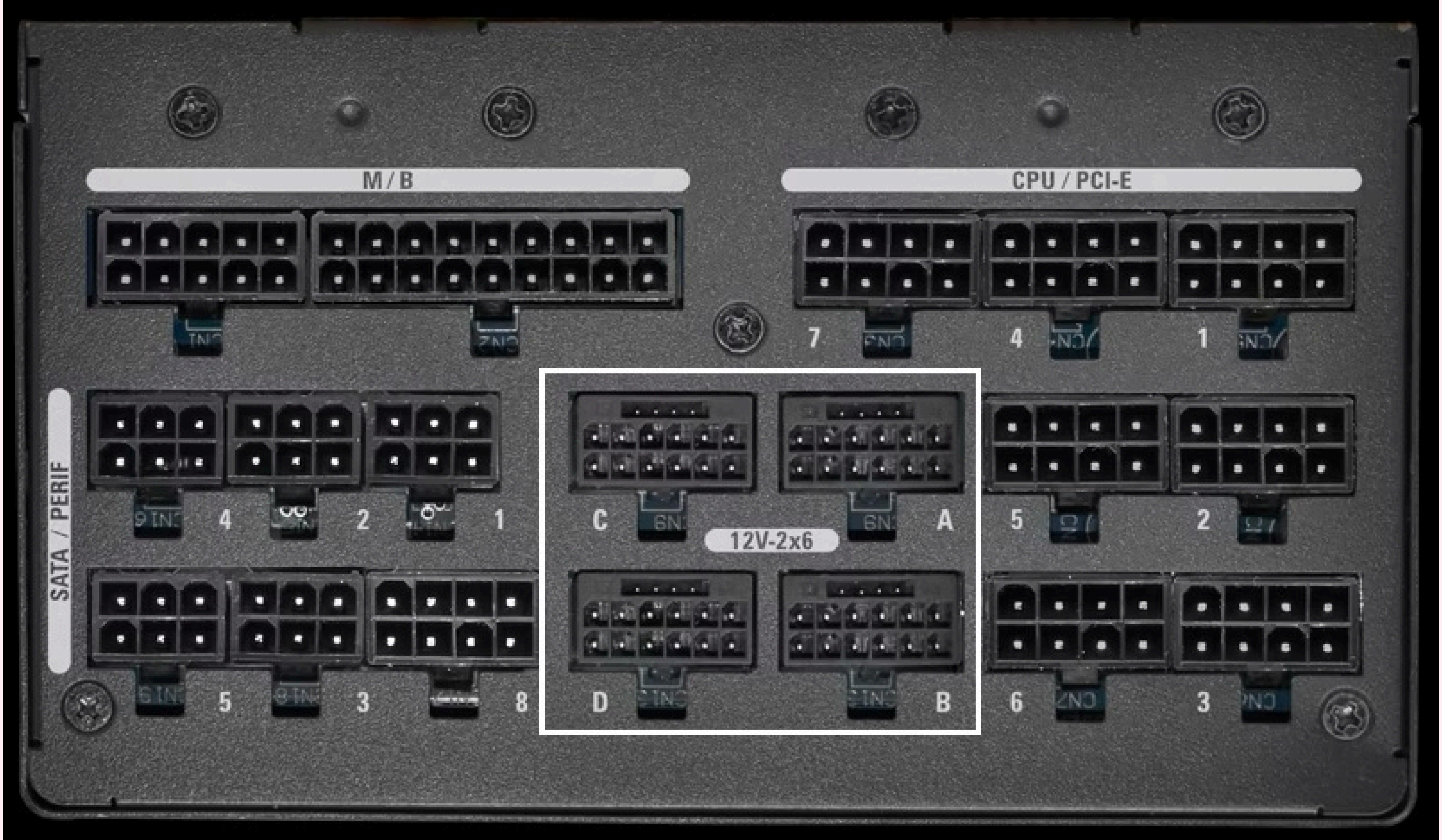
Power Supply

CPU Cooling

Filter Criteria Summary (4-Card Configurations)

⚠️ Primary Requirement (Non-Negotiable)

Specifications	Note
Native PCIe 5.1 12V-2×6 Power Connectors	1️⃣ Four dedicated cables required—one per GPU 2️⃣ **No adapters or splitters permitted** 3️⃣ Ensures electrical integrity and thermal stability for sustained AI workloads
200–240V AC Required	2500W+ PSUs cannot deliver full output on 110–120V
Cybenetics Titanium Grade or **80 PLUS® 230V EU platinum certified**	1️⃣ Maximizes efficiency under sustained load 2️⃣ Reduces chassis heat and electrical loss Critical for 24/7 AI training/inference in thermally dense multi-GPU systems


M / B
CPU / PCI-E
SATA / PERIF
12V-2x6
7
4
1
C
A
5
2
4
2
1
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D
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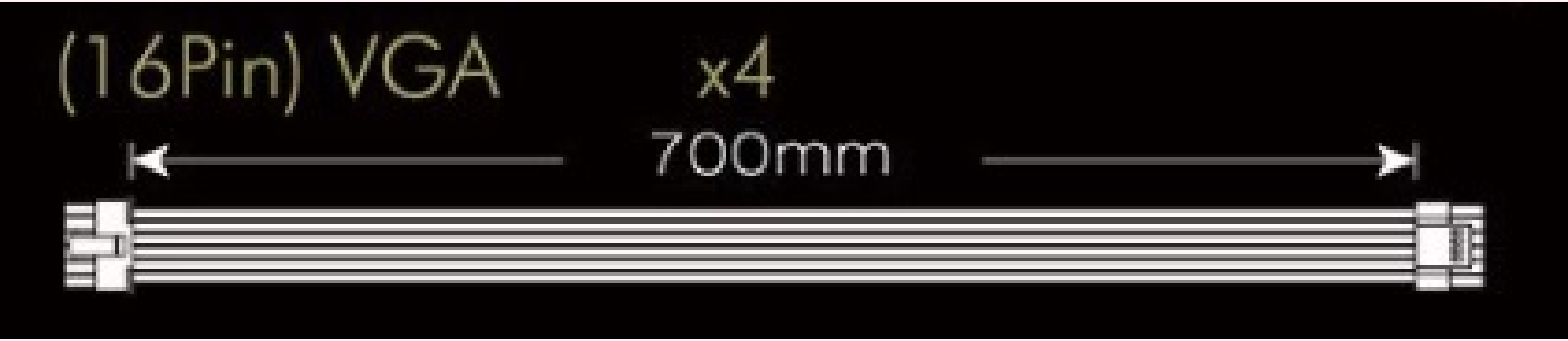
PCIe 5.1 12V-2×6 Power cables

Image source: https://www.super-flower.com.tw/en/products/leadex-titanium-2800w-20250526150946



Compliant Power Supply Models

Product Name	Efficiency Certification	Note
Leadex Titanium 2800W 🔗	Cybenetics Titanium	NEWEGG MICROCENTER CENTRAL COMPUTER
CANNON PRO(ATX3.1) 2500W 🔗	80 PLUS® 230V EU Platinum	Check FSP Group USA and Amazon FSP Store
In Win PII-250 🔗	80 PLUS® 230V EU Platinum	Check InWinStore and Magna5 MS, LLC

Case

Power Supply

CPU Cooling

CPU Air Cooling for 4-GPU AI Workstations

Why	Note
System Stability Over Peak Performance	1 Four high-power GPUs demand consistent, predictable thermal management 2 Air cooling eliminates catastrophic failure modes: pump failure and coolant leaks 3 No single point of failure in cooling subsystem
Optimized Airflow Architecture	1 Synchronized front-to-back linear airflow aligns with chassis fan layout 2 Uniform thermal envelope across all critical components 3 Simplified maintenance and zero risk of thermal runaway from coolant loss
Engineering for Longevity	1 Designed for uninterrupted 24/7 AI training and inference 2 Passive reliability beats active complexity in mission-critical deployments 3 Total system uptime prioritized over marginal CPU temperature gains

Compliant CPU Coolers

Product Name	Note
ARCTIC Freezer 4U 🔗	Used in ASRock AI Center demonstration system
Noctua NH-U14S TR5-SP6 🔗	**MAINGEAR PRO AI** 🔗 features top-of-the-line Noctua cooling throughout, resulting in one of the quietest AI training and data preparation workstations on the market, without sacrificing performance.

End