



SUPERMICRO GPU SYSTEMS ACCELERATE ANSYS APPLICATIONS 10X & MORE



Supermicro H13 Systems Deliver Faster Results, Solve Bigger Simulations, Run Greener

Executive Summary

Using NVIDIA GPUs running on Supermicro systems, Ansys demonstrates 6X to 1,600X speedup in performance for its top applications, including Ansys® Fluent®, Ansys® Mechanical™, Ansys® Rocky™, Ansys® HFSS(rm), Ansys® optiSLang® AI+. By adding GPUs, the application performance scales nearly linearly.

With orders of magnitude application speedup, product designers arrive at optimal designs much faster and deliver more complex designs, bringing innovations not seen before. Using Ansys optiSLang AI+, AI/ML now guides simulation, eliminating manual searches for the optimal solution, delivering 1600X performance speedup for HFSS.

Ansys Fluent	Designing airplanes, autos, machines - Aerodynamics and hydrodynamics simulations - Heat transfer and thermal management - Multiphase flows - Chemical reactions and combustion
Ansys Mechanical	Designing structures - Static and dynamic structural analysis - Thermal analysis - Fatigue and fracture mechanics - Nonlinear material behavior
Ansys Rocky	Designing systems to handle material flows - Bulk material handling - Particle processing and manufacturing - Granular flow in equipment
Ansys HFSS	Designing 5G, wireless, radio, communication systems - Antenna design and placement - Electronic package signal integrity - EMI/EMC analysis - Microwave circuit design
Ansys optiSLang AI+	Accelerating Ansys application designs - Optimization, sensitivity studies - AI/ML guiding simulations, removing manual searches - Metamodeling - Integration with other Ansys tools

Supermicro offers a range of H13 systems using AMD CPUs and NVIDIA GPUs, such as a workstation supporting individual designers to multi-node 8-GPU systems that can deliver Ansys solver results in minutes for complex multiphysics problems.

NVIDIA GPU Speed-Up

Ansys has ported multiple applications from its portfolio to using GPU, especially the NVIDIA H100, with orders of magnitude in performance speed-up. The H100 speed-up is significant, especially when adding GPU, which can linearly scale performance. By adding GPUs in multiple servers, much 'bigger' simulation models can be solved quickly.

Compared to the same Ansys simulations run on CPUs, the hardware platform powered by NVIDIA and optimized by Supermicro delivered massive performance gains, as depicted below.

	Speedup	Comparison	Benchmark
Ansys Fluent	24X	8 x H100 GPUs vs. 512 CPU cores	LES Turbulence, 250M cells
Ansys Mechanical	6X	1 x H100 GPU vs. no GPU, both w/ 4 CPU cores	MAPDL Direct Sparse, 50M DOF
Ansys Rocky	17X	1 x H100 vs. 1 x V100 (1 x V100 vs. 8 CPU cores has 70X speedup)	Rotating drum, 16M spheres, 16M polyhedrons
Ansys HFSS	11X	8 x H100 vs. no GPU, both w/ 12 CPU cores	Mobile 5G Antenna, 5GHz mm Wave
Ansys optiSLang AI+	1,600X	optiSLang AI+ w/ HFSS vs. HFSS alone (12 CPU cores + 8 x H100 running HFSS)	HFSS simulations to generate 80 design points

The Ansys benchmarks above compare the NVIDIA H100 GPU versus CPU performance, and there are significant speed-ups. For Rocky, the performance comparison is H100 versus V100 GPU, which shows significant speed-up using the latest generation of GPU compared to previous versions.

By applying machine learning and AI, Ansys optiSLang AI+ running on 8 x H100 enables HFSS to run 1,600X faster to generate design points. Using AI, optiSLang AI+ removes manual searches when optimizing HFSS and other Ansys applications, enabling much faster results. The software performs best with Supermicro systems with H100.

Supermicro Value

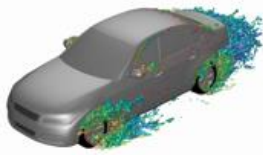
Supermicro systems offer great value to run Ansys applications:

- Broadest portfolio of systems to support NVIDIA GPU
- Choice of NVIDIA GPU, from H100NVL, H100, L40S, to RTX GPUs
- Building Block approach that delivers the latest technologies
- Green designs & liquid cooling options reduce power and increase performance

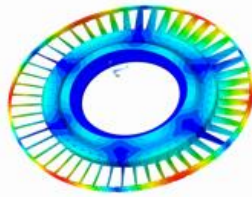
Ansys Multiphysics for Real-World Physics

- Complex interaction of
- Fluid dynamics
 - Heat transfer
 - Structural mechanics
 - Electromagnetism
 - & other forces

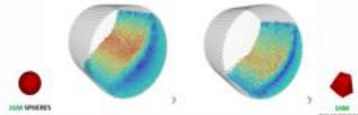
Supermicro Systems Provides GPU Options to Run Ansys Applications



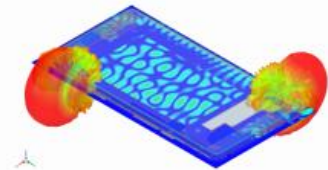
Ansys Fluent
Automotive
External Aerodynamics







Ansys Mechanical
Low Pressure Turbine



Ansys Rocky
Rotating Drum



Ansys HFSS
Mobile 5G Antenna

<p>AS -5014A-TT</p> 	<p>Deskside workstation for individual Ansys users</p> <ul style="list-style-type: none"> - AMD Ryzen™ Threadripper™ PRO 5000X - 1TB - PCIe Gen 5 - NVMe - Up to 4 x NVIDIA GPUs
<p>AS -2115HV-TNRT Rack-mount Workstation</p> 	<p>Rack-mount Workstation for individual Ansys users</p> <ul style="list-style-type: none"> - AMD Ryzen™ Threadripper™ PRO 7000X - 512GB - PCIe Gen 5 - NVMe - Up to 2 x NVIDIA GPUs - 2U Rack-mount
<p>AS -2025HS-TNR</p> 	<p>2U Rack server with/without GPU to scale Ansys</p> <ul style="list-style-type: none"> - Dual AMD 4th Gen EPYC CPU, upgradeable to 5th Gen - 6TB - PCIe Gen 5 - NVMe - Up to 2 x NVIDIA H100, L40S, and other GPUs - 2U Rack-mount
<p>AS -4125GS-TNRT</p> 	<p>4U Rack GPU server to scale Ansys applications</p> <ul style="list-style-type: none"> - Dual AMD 4th Gen EPYC, upgradeable to 5th Gen CPUs - 6TB - PCIe Gen 5 - NVMe - Up to 8 x NVIDIA H100, L40S, and other GPUs - 4U Rack-mount

Depending on the types of problems being solved, customers running Ansys could use a single workstation or hundreds of CPU-based servers to solve complex problems. Supermicro offers this entire range of systems.

With the AS -5014A-TT, the workstation provides a single AMD Ryzen Threadripper PRO CPU with support from 0 to 4 GPUs. AS -2115HV-TNRT is essentially a rack-mount version of this workstation.

To support multiple users or to support a server cluster that can solve more significant problems quicker, the 2U AS -2025HS-TNR can be used. These servers support 2 CPUs and up to 2 GPUs, offering good computation capabilities. For a server that can support up to 10 GPUs, consider the AS -4125GS-TNRT.

GPU Choices

Here are the top choices of NVIDIA GPUs available for the Supermicro systems, in addition to many other GPU options:

Specification	H100 NVL	L40S	L4	RTX 5000 Ada
Architecture	Hopper	Ada Lovelace	Ada Lovelace	Ada Lovelace
CUDA Cores	16,896	18,176	7680	7680
GPU Memory	94GB HBM3	48GB GDDR6	24GB GDDR6	24GB GDDR6
NVLINK	NVLink 900GB/s	-	-	-
PCIe	PCIe Gen5 128GB/s	PCIe Gen4 x16: 64GB/s	PCIe Gen4 x16: 64GB/s	PCIe Gen4 x16: 64GB/s
TDP	350-400W	350W	40-72W	40-72W
Form Factor	FLFH, dual-slot	FLFH, dual-slot	LP, 1-slot	LP, 1-slot
FP64 Performance	34 TFLOPS	1.43 TFLOPS	0.47 TFLOPS	0.47 TFLOPS
FP32 Performance	67 TFLOPS	91.6 TFLOPS	30.3 TFLOPS	30.3 TFLOPS
RT Cores	-	142 3rd gen	60 3rd gen	60 3rd gen

Recommended Configurations

Deskside-Workstation, Liquid-cooled, max 4 active GPUs	Description	Qty
AS -5014A-TT	M12SWA-TF, GS7A-2000B	1
PSE-TRPR5995WX-0444	AMD 599wWX, Ryzen Threadripper PRO, UP 64C/128T 2.7G 256M 280W SP3, HF, RoHS---PSE-TRPR5995WX-0444	1
MEM-DR464L-CL05-ER32	64GB DDR4 1.2V 3200 ECC REG---MEM-DR464L-CL05-ER32	2
HDS-MMN-MTFDKBA480TFR-15	Micron 7450 PRO 480GB NVMe PCIe 4.0 M.2 22x80mm TCG Opal	1
HDS-SUN0-MZQL23T8HCLSA7	PM9A3 3.84TB NVMe PCIe4x4 2.5" 7mm (1DWPD) SED	1
DVM-TEAC-DVDRW24-HBT	BLACK TEAC 5.25" HH 24X DVD-RW SATA DRIVE	1
GPU-NVQRTX-A2000-12-SI	RTX A2000 12 GB GDDR6 PCIe 4.0-Active (system assembly)---GPU-NVQRTX-A2000-12-SI	1
AOC-STGS-i2T-O	2-ports 10GbE RJ45 Intel X550-AT2, Gen3 x4 LP -- AOC-STGS-I2T-O	1
SNK-P3045A4	1U Closed Loop Liquid Cooling Module for H12 AMD SP3 CPU	1

Rack-mount Workstation, max 4 GPU	Description	Qty
AS -2115HV-TNRT	A+ 2U Remote Workstation (H13SRH, CSE-HS201-R000NP)	1
PSE-TRPR7995WX-0884	AMD Ryzen Threadripper PRO 7995WX, UP 96C/192T 2.5G 384M 350W---PSE-TRPR7995WX-0884	1
MEM-DR564L-CL02-ER56	64GB DDR5 5600 ECC REG---MEM-DR564L-CL02-ER56	2
HDS-MMN-MTFDKBA480TFR1BC	Micron 7450 PRO 480GB NVMe PCIe 4.0 M.2 22x80mm 3D TLC, 1DWPD	1
HDS-MUN-MTFDKCB3T8TFR1BC	7450 PRO 3.8TB NVMe PCIe 4.0 3D TLC 7mm,1DWPD	1
AOC-ATG-b2TM-O	AIOM 2-port 10GbE RJ45 AIOM Broadcom BCM57416	1
GPU-NVQRTX6000-ADA	NVIDIA Quadro RTX6000 ADA Gen. 48GB GDDR6 PCIe 4-Active---GPU-NVQRTX6000-ADA	1
PWS-1K63A-1R	1U 1000W/1600W redundant single output power supply	2

2U Dual-CPU server, up to 2 GPUs	Description	Qty
AS -2025HS-TNR	H13DSH, CSE-HS829-R1K63P,RoHS	1
PSE-GEN9454-0478	AMD EPYC 9454 DP/UP 48C/96T 2.75G 256M 290W SP5---PSE-GEN9454-0478	2
MEM-DR564L-SL01-ER56	64GB DDR5 5600 ECC REG---MEM-DR564L-SL01-ER56	24
HDS-MUN-MTFDKCB3T8TFR1BC	7450 PRO 3.8TB NVMe PCIe 4.0 3D TLC 7mm,1DWPD	2
AOC-A100G-b2CM-O	AIOM 2-port 100GbE QSFP28, based on Broadcom BCM57508---AOC-A100G-B2CM-O	1
GPU-NVH100-80	NVIDIA H100 80GB PCIe 5.0 x16 Passive Cooling---GPU-NVH100-80	1

GPU Server, up to 10 GPUs	Description	Qty
AS -4125GS-TNRT	H13DSG-O-CPU, CSE-418G2TS, AOM-PCIE5-418N-1	1
PSE-GEN9454-0478	AMD EPYC 9454 DP/UP 48C/96T 2.75G 256M 290W SP5---PSE-GEN9454-0478	2
MEM-DR596L-CL01-ER48	96GB DDR5 4800 ECC REG---MEM-DR596L-CL01-ER48	12
HDS-IUN0-SBFPF2BU038T	Solidigm D5-P5430 3.84T PCIe 4x4 QLC U.2 15mm < 0.5 DWPD	2
GPU-NVH100NVL	NVIDIA H100 NVL 94GB PCIe 5.0 x16 Passive Cooling---GPU-NVH100NVL	8
AOC-653106A-HDAT	2-ports 200Gb HDR 200GbE QSFP56 Mellanox CX-6 VPI, Gen4 x16 LP -- AOC-653106A-HDAT	1
SFT-DCMS-SINGLE	Datacenter Management Package (per node license)	1

Broad System Choices to Support Ansys

Supermicro offers a broad set of systems choices:

- Smaller scale Ansys simulations: desktide, rack-mount workstations, virtual desktop infrastructure (VDI)
- Solutions to complex problems using Ansys: CPU server clusters
- Faster solutions to complex problems and bigger solutions to complex multiphysics: GPU server clusters

Workstations for Ansys

Desktide Workstation Rack-mount Workstation VDI with GPUs

* Many other systems options available.

HPC Servers for Ansys

HPC CPU Cluster HPC CPU + GPU Cluster HPC GPU Cluster

* Many other systems options available.

Conclusion

Supermicro GPU systems deliver 5-72X performance speedup for Ansys applications. With a wide range of systems, customers can choose the right system for their need to run Ansys simulation software.

For more information:

[Supermicro Deskside Workstation](#)

[Supermicro Rack-mount Workstation](#)

[Supermicro Dual AMD EPYC Server, with GPU support](#)

[Supermicro GPU Server, supporting up to 8 GPUs](#)

[Ansys](#)

SUPERMICRO

As a global leader in high performance, high efficiency server technology and innovation, we develop and provide end-to-end green computing solutions to the data center, cloud computing, enterprise IT, big data, HPC, and embedded markets. Our Building Block Solutions® approach allows us to provide a broad range of SKUs, and enables us to build and deliver application-optimized solutions based upon your requirements.

ANSYS

For more than 50 years, Ansys software has enabled innovators across industries to push boundaries with the predictive power of simulation. From sustainable transportation and advanced semiconductors, to satellite systems and life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.