POWER EFFICIENCY OF AMD EPYC™ 9754 PROCESSORS
SPECPOWER_SSJ® 2008

Powered by 4th Gen AMD EPYC™ 9754 Processors

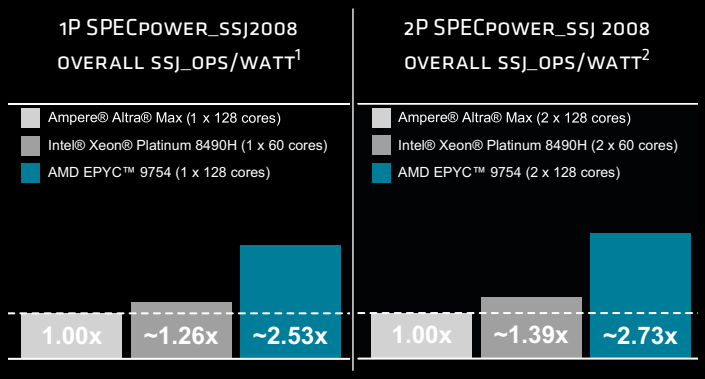
June 2023

AT A GLANCE

1P and 2P systems powered by 128-core 4th Gen AMD EPYC™ 9754 CPUs show strong performance per system watt uplifts on the SPECpower_ssj® 2008 workload vs. top of stack Intel® Xeon® Platinum 8490H and Ampere® Altra® Max M128-30 CPUs.

PERFORMANCE HIGHLIGHTS

A 2P 128-core 4th Gen AMD EPYC 9754 system demonstrates ~2.73x SPECpower_ssj 2008 overall ssj_ops/watt uplifts vs. 2P 128-core Ampere® Altra® Max M128-30 systems. A 1P 128-core 4th Gen AMD EPYC 9754 system demonstrates ~2.53x SPECpower_ssj®2008 overall ssj_ops/watt uplifts vs. 1P Ampere® Altra® Max M128-30 128-core systems.



KEY TAKEAWAYS

Cloud Service Provides (CSPs) must fulfill a growing demand for public cloud Infrastructure as a Service (IaaS) and hybrid cloud integrations by providing VMs with varying vCPU, memory, and network options to support diverse workloads that can be quickly reconfigured for Platform as a Service (PaaS) deployments at the software level. 4th Gen AMD EPYC 9754 (128-core) processors demonstrate superb competitive performance per system watt uplifts compared to the Intel Xeon Platinum 8490H and Ampere Altra Max (128-core) processors in both 1P and 2P configurations.

4th Gen AMD EPYC 97x4 processors are available in 1P and 2P configurations and feature:

- Up to 128 cores (256 threads) per processor.
- Up to 256MB L3 cache.
- Up to 4 links of Gen 3 Infinity Fabric™ at up to 32 Gbps.
- 12 memory channels that support up to 6TB of DDR5-4800 memory.
- Support for PCIe® Gen 5 at up to 32 Gbps.
- AVX-512 instruction support for enhanced HPC and ML performance.
- AMD Infinity Guard technology to defend your data.[3]

IN THIS BRIEF

TEST METHODOLOGY

The SPECpower_ssj 2008® benchmark from the Standard Performance Evaluation Corporation (SPEC®) provides a comparative measure of the energy efficiency of volume server class computers by evaluating both the power and performance characteristics of the System Under Test (*sut*). The SPEC Power benchmark is the first industry-standard benchmark that evaluates the power and performance characteristics of single server and multi-node servers. The SPECpower_ssj 2008 benchmark's defined measurement standard allows customers to compare the energy efficiency against other configurations and servers. The benchmark is targeted for use by hardware vendors, IT industry, Original Equipment Manufacturers (OEMs), and governments. The SPECpower_ssj 2008 metric is defined as "overall ssj_ops/watt", which indicates the power efficiency of the SUT. It is calculated as the ratio of the overall throughput ssj_ops, which is the sum of all ssj_ops scores for all target loads, and the sum of all power consumption averages in watts for all target loads. In this Performance Brief, the Ampere Altra Max systems are the *ref* systems, and the Intel Xeon Platinum 8490H and 4th Gen AMD EPYC 9754 systems are the *sut*. All results are published at https://www.spec.org/power_ssj 2008/results/.

With an industry-leading 128 cores per x86 socket, the AMD EPYC 9754 processor exhibits compelling performance uplifts across the benchmarks listed in this Performance Brief as per published 2P and 1P configurations.

FOR ADDITIONAL INFORMATION

Please see the following additional resources for more information about 4th Gen AMD EPYC features, architecture, and available models:

- AMD EPYC™ 9004 Series Processors
- AMD EPYC™ Tuning Guides
- AMD EPYC™ Products

REFERENCES

1. Results as of 6/13/2023 are published at:
   - 1P Ampere Altra Max M128-30, 11,497 SPECpower_ssj2008 overall ssj_ops/watt https://www.spec.org/power_ssj2008/results/res2023q2/power_ssj2008-20230522-01260.html
   - 1P Intel® Xeon® Platinum 8490H (60-core) 14,537 SPECpower_ssj2008 overall ssj_ops/watt https://www.spec.org/power_ssj2008/results/res2023q1/power_ssj2008-20221205-01205.html
   - 1P AMD EPYC™9754 (128-core, SMT on) 29,124 SPECpower_ssj2008 overall ssj_ops/watt https://www.spec.org/power_ssj2008/results/res2023q2/power_ssj2008-20230521-01255.html
2. Results as of 6/13/2023 are published at:
   - 2P Ampere Altra Max M128-30, 12,195 SPECpower_ssj2008 overall ssj_ops/watt https://www.spec.org/power_ssj2008/results/res2023q2/power_ssj2008-20230522-01258.html
   - 2P Intel® Xeon® Platinum 8490H (60-core) 16,902 PECpower_ssj2008 overall ssj_ops/watt https://www.spec.org/power_ssj2008/results/res2023q2/power_ssj2008-20230507-01251.html
   - 2P AMD EPYC™9754 (128-core, SMT on) 33,300 SPECpower_ssj2008 overall ssj_ops/watt https://www.spec.org/power_ssj2008/results/res2023q2/power_ssj2008-20230523-01264.html
3. AMD Infinity Guard features vary by EPYC™ Processor generations. Infinity Guard security features must be enabled by server OEMs and/or Cloud Service Providers to operate. Check with your OEM or provider to confirm support of these features. Learn more about Infinity Guard at https://www.amd.com/en/technologies/infinity-guard. GD-183
4. Maximum boost for AMD EPYC processors is the maximum frequency achievable by any single core on the processor under normal operating conditions for server systems. EPYC-18

AUTHORS

Anil Rajput and Gnanakumar Rajaram contributed to this Performance Brief.

RELATED LINKS

- SPECpower_ssj® 2008*
- AMD EPYC Processors
- AMD EPYC Technical Briefs

**Links to third party sites are provided for convenience and unless explicitly stated, AMD is not responsible for the contents of such linked sites and no endorsement is implied.*

NO-COMPROMISE CLOUD NATIVE COMPUTING

Cloud native development practices are emerging as an optimized approach for developers to rapidly deliver more efficient and scalable services. The demand for cloud services and infrastructure continues to grow. Systems featuring 4th Gen AMD EPYC™ 97x4 processors can provide a robust, efficient environment to run the most demanding and scalable cloud native services and enterprise applications.

"ZEN 4" CORE & SECURITY FEATURES

Support for up to:

- 128 physical cores, 256 threads
- 256 MB of L3 cache per CPU
- 96 MB of L3 cache per CCD
- 6 TB of DDR5-4800 memory
- Up to 128 1P, up to 160 2P PCIe® Gen 5 lanes

Infinity Guard security features[3]

- Secure Boot
- Encrypted memory with SME

DESIGNED FOR CLOUD NATIVE COMPUTING

Platforms powered by 4th Gen AMD EPYC™ 97x4 Series processors provide core compute densities (up to 128 cores/socket), memory capacities, bandwidth, and up to either 128 (1P) or 160 (2P) lanes of high-speed PCIe® Gen5 lanes I/O to meet design challenges encountered by Cloud Service Providers (CSPs) fulfilling the growing demands of public cloud infrastructures.

SPECPOWER_SSJ® 2008

The SPEC Power benchmark is the first industry-standard benchmark for evaluating the power and performance characteristics of single- and multi-node. It compares power and performance among different servers and can be used as a tool to help optimize server efficiency. This benchmark is targeted for use by hardware vendors, IT industry, computer manufacturers, and governments.