

AMD Storage Solutions:

High-Performance Storage for Datacenters, Cloud and Edge

AMD EPYC[™] Embedded 9004 Series

AMD EPYC[™] Embedded 7003 Series

AMD EPYC[™] Embedded 7002 Series

AMD Ryzen[™] Embedded V-Series

Versatile, Space & Power Efficient Storage Solutions

AMD EPYC[™] Embedded 3000 Series

AMD Ryzen[™] Embedded V-Series

AMD Ryzen[™] Embedded 5000 Series

Application Brief: AMD Storage Solutions

Seamlessly Scalable Processing Performance and I/O for Ultra-Efficient Storage from Enterprise to Cloud

As application workloads continue to grow exponentially and compute needs intensify, the processing performance and I/O connectivity required at the storage layer are growing commensurately. Modern storage infrastructure demands a flexible x86 processing platform that can efficiently scale for workloads and environments of all sizes, from the edge to the cloud.

Wherever data lives, its value can be maximized faster with agile, resilient storage systems that take advantage of the latest innovations in processor core and I/O connectivity architectures. From HPC- class computational storage systems to cloud and enterprise-class flash, HDD and hybrid arrays – even SMB and consumer NAS devices – advanced x86 processing agility can unlock huge gains in storage efficiency for traditional storage architectures and the fast-evolving next generation of software-defined storage networking environments.

The AMD Embedded Advantage

AMD EPYC[™] and Ryzen[™] Embedded processors provide a seamlessly scalable platform that can enable one motherboard design to service a wide range of storage solutions for OEMs and ODMs looking to optimize design and development efficiencies while helping reduce overall storage system costs. The flexible connectivity and computational performance options enabled with AMD EPYC[™] and Ryzen[™] Embedded processors make it easy to design storage solutions tailored to customers' unique storage requirements, from enterprise, cloud to on-premise, and beyond.

AMD EPYC[™] Embedded 9004 Series processors

deliver breakthrough performance scalable up to 96 cores with expansive x86 PCle[®] 5 connectivity for scale-out cloud datacenter, enterprise and edge storage infrastructure.

AMD Ryzen[™] Embedded Series processors

provide scalable performance up to 16 cores (AMD Ryzen[™] Embedded 5000 and 7000 Series) with low thermal design power (TDP) profiles starting at 10W and DDR5 with ECC (AMD Ryzen[™] Embedded V3000) for space and energy efficient designs targeting cloud warm/cold storage applications.



Key AMD Benefits

Key Storage Benefits

AMD Embedded processors provide expansive I/O support and flexibility. AMD EPYC Embedded 9004 Series processors integrate a broad set of highspeed interfaces with 128 I/O lanes capable of up to PCIe[®] Gen5 speeds per socket (up to 160 lanes in 2P configurations), 12 bonus PCIe[®] lanes, and support for 32 SATA devices. AMD EPYC Embedded 9004 Series processors are equipped with the latest and fastest DDR5 memory, supporting 12 memory channels with transfer rates up to 4800 MT/s. AMD EPYC[™] Embedded 7002 and 7003 Series processors integrate a broad set of high-speed interfaces with 128 I/O lanes capable of up to PCIe[®] Gen4 speeds (up to 160 lanes in 2P configurations), and support for 32 SATA or NVMe devices.

Enterprise and next-generation Cloud-Edge storage systems impose critical high availability and performance requirements that AMD solutions support, like native Non-Transparent Bridging on the integrated PCIe interface (AMD EPYC[™] Embedded 9004, 7002 and 7003 Series), NVDIMM-N support, CXL 1.1+ with type 3 memory device support*, enterprise RAS and storage hot-plug (including NVMe passthrough hotplug on ESXi).

Native Non-Transparent Bridging (NTB) running on PCI Express interface helps enhance system reliability by enabling data exchange between two redundant CPU units. The included PCIe[®] System Firmware Intermediary (SFI) capability that isolates PCIe[®] hot plug events from OS and applications adds a firmware layer between OS and devices to enhance robustness, security, and traceability of hot plug events (available with AMD EPYC Embedded 9004 series).

Non-Volatile Dual In-Line Memory Module (NVDIMM) is a hybrid memory consisting of volatile DRAMs and non-volatile Flash memory that helps retain data after a system power failure or reset by saving DRAM contents to Flash. Supported cache-to-flash schemes include Asynchronous DRAM Refresh (ADR) and Extended ADR (eADR) to provide persistence from the NVM to the CPU caches (available with AMD EPYC Embedded 9004 Series).

In addition, AMD's GPU and FPGAs as well as ecosystem partners provide innovative enterprise and cloud storage acceleration solutions. AMD Tuning guides and NVMe tuning guides are available through AMD's extensive library of <u>AMD EPYC^{**} Server Performance Tuning Guides</u>.

Breakthrough Performance

AMD Embedded processors meet the most demanding storage throughput requirements and are scalable up to 96 cores/192 threads (AMD EPYC[™] Embedded 9004 Series), supporting a wide range of performance profiles. Among their many achievements, AMD EPYC[™] processors have set over <u>300+ world records</u> *** and counting including integer and floating-point speeds (SPEC[®]), <u>TPC-H benchmarks[®]</u>, enterprise and datacenter.

Power Efficiency

AMD Embedded processing solutions support a wide range of thermal design profiles (TDPs), with embedded processors that scale as low as 10W (AMD Ryzen Embedded V3000 Series), helping designers achieve the optimal performance-per-watt, and minimize thermal constraints and associated system size and cost penalties.

Expansive I/O Options

AMD Embedded processing solutions provide expansive PCIe[®] Gen5 connectivity up to 128 lanes and 32 SATA devices on AMD EPYC[™] Embedded 9004 Series and PCIe[®] Gen4 connectivity on AMD Ryzen[™] Embedded V3000 Series to accommodate a broad range of I/O requirements.

Advanced Security Features

AMD EPYC[™] processing solutions feature an independent on-board AMD Security Processor, with available capabilities including Secure Encrypted Virtualization (SEV) for securely isolating hypervisors and virtual machines (VMs) in virtualized storage environments, and secure Memory Encryption (SME) for defending against unauthorized memory access.

In addition, the integrated AMD Secure Processor provides secure boot support and integrates a NIST Entropy Source Validation (ESV) certified RNG (Random Number Generator) for supporting cryptographic operations.

Enterprise-caliber Dependability

AMD Embedded processors provide enterprise-class reliability, availability and serviceability (RAS) features, with advanced error detection, correction, recovery and containment capabilities for superior data integrity. Key RAS features available with AMD EPYC[™] Embedded 9004 Series processors include DRAM ECC with AMDC (Advanced Memory Device Correction) providing the ability to correct and recover from errors even when a DRAM device has errors on all data signals, improving system uptime.

Supply Longevity

AMD's planned processor longevity extends to up to 10 years*, providing customers with a long-lifecycle support roadmap.

*On select EPYC 7000 & 9000 Embedded OPNs

For more information about the specific features and specifications supported by select products in AMD's processor portfolio, or to learn more about AMD's storage networking solutions, visit **www.amd.com/storage**

AMD.com/embedded

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