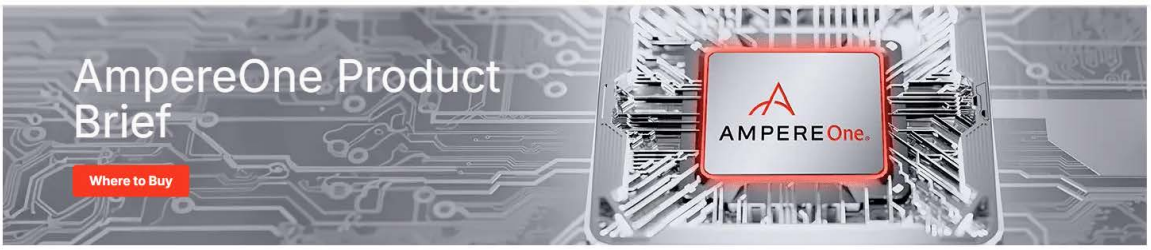

AMPEREONE® 64-BIT MULTI-CORE PROCESSORS

AmpereOne® is the next generation of Cloud Native Processors from Ampere, extending the family of high-performance processors to new industry leading core counts. The AmpereOne family establishes new levels of performance and VM density for computing solutions at scale.

AmpereOne compliments the existing Ampere® Altra® products and adheres to the same Cloud Native principles:

- High Performance and Predictable
- Elastic and Scalable
- Power Efficient and Sustainable

Ampere is more. More cores, more memory bandwidth, more memory capacity, more IO bandwidth, and more Cloud Native features. Read how AmpereOne processors can help fuel the next wave of innovation

AMPEREONE FEATURES

	AMPEREONE FAMILY
Custom Core Count	96 cores - 192 cores
Private Caches	L2: 2 MB per Core L1: 16 KB Instruction and 64 KB Data per Core
System Level Cache	64 MB
Memory	8 Channel DDR5 with ECC Up to 16 DIMMs (2DPC) and 4 TB per socket for a total of 8 TB on a two socket system
Connectivity	128 Lanes PCIe Gen5 (optional 64 lane CCIX for multi-socket support) 32 Controllers Bifurcation to x4
System Features	- Interrupt Virtualization - IO Virtualization - Enterprise RAS: Memory - SECDED and Symbol Based ECC protected; other memory SECDED ECC protected throughout - Coherent Mesh Interconnect with distributed snoop filtering

Cloud Native Features

- Single Threaded Cores
- Consistent Freq up to 3.7 GHz
- 2×128b Vector Units: FP16, Bfloat16, Int8 and Int16

Scalable Management

- Fine Grained Power Mgmt
- Advanced Droop Detection
- Process Aging Monitors

Security

- Secure Virtualization
- Single-Key Memory Encryption
- Memory Tagging

Performance Consistency

- Mesh Congestion Mgmt
- Memory/SLC QoS Enforcement
- Nested Virtualization

Other Specifications

- Instruction Set Compatibility: Armv8.6+, SBSA 5
- Independent System and Power Controllers (SECpro and Mpro)
- PCBA System Support: I2C, GPIO, QSPI and GPI Interrupt Support, System and Watchdog Timer Support
- Operating Temperature Range: 5°C ambient to +105°C TJ
- Process: TSMC 5 nm
- Socket Compatible Packages: 5964-Pin FCLGA

HIGH PERFORMANCE AND PREDICTABLE

The AmpereOne family picks up from the top end of the Ampere Altra family, offering products from 96 cores up to 192 cores operating at consistent and predictable frequencies of up to 3.7 GHz. Each core is single-threaded by design with its own 16 KB L1 Instruction-cache, 64 KB L1 Data-cache, while doubling the L2 private cache to 2 MB.

Large private caching, consistent operating frequency, single threaded cores, and new memory management features combine to deliver predictable performance by mitigating the noisy neighbor challenges in multi-core processing architectures while providing a very secure microarchitecture for multi-tenant cloud environments.

A coherent mesh interconnect provides efficient bandwidth with 64 distributed home nodes and directory-based snoop filters to enable seamless connectivity between the cores. AmpereOne also adds Mesh congestion management and QOS enforcement features further augmenting the predicable behavior of data movement in high core count products.

Supporting eight 80-bit DDR5 channels, the AmpereOne family offers an improvement in memory bandwidth and a larger addressable space of up to 8 TB of memory.

ELASTIC AND SCALABLE

Using industry leading power efficiency per core, the AmpereOne family provides high performance processing products up to 192 cores providing further scalability to deploy dense compute for the most demanding compute installations on the planet, especially in hyperscale data centers.

AmpereOne dense Cloud Native Processors deliver the most cores per rack, maximize the number of servers per rack, and provide the highest performance per rack for the most sustainable and power- efficient computing installations in the industry.

The AmpereOne family provides consistent incremental performance on a per core basis. Workloads scale linearly as more processes are added to the single-threaded cores. For dense virtual machine implementations, more VMs can be provisioned on an AmpereOne high core count processor than any other compute product in the industry.

With up to 128 lanes of PCIe Gen5 (32 GT/s per lane) per socket, the AmpereOne family provides the flexibility to add up to 32 off-chip devices, including networking cards, storage/NVMe devices, GPUs, and other accelerators. AmpereOne platforms are well suited to a variety of system configurations delivering the highest performance for large capacity storage, networking, AI inference, and the newest generative AI models and applications.

POWER EFFICIENT AND SUSTAINABLE

The AmpereOne family leads all other server compute products in this key metric: performance per rack. This allows operators and IT designers unprecedented compute capacity for high-density compute environments. This advantage reduces rack and floor space, trims power requirements for operational efficiency, and

saves money. Carbon footprints are drastically reduced allowing managers to meet aggressive ESG goals and shorten the time to Net-Zero emissions initiatives.

The densest compute products in the AmpereOne family allow Cloud Native workloads to scale out providing maximum rack capacity and outperforming legacy x86 products at the rack level. This efficiency can reduce operational IT budgets by 10s to 100s of millions of dollars.

The AmpereOne family includes new advanced power management features: Advanced Configuration Power Interface (ACPI) v6.4 support; Adaptive Voltage Scaling (AVS); Dynamic Voltage Frequency Scaling (DVFS); fine-grained thermal monitoring and power provisioning; and dynamic power estimation.

AMPEREONE ENHANCED SECURITY

FEATURES	BENEFIT
Speculative Side Channel Attack Mitigation	Additional protection against a class of potential attacks that use side channels
Buffer Overflow Protection/Memory Tagging	Prevents a class of potential attacks that use buffer overflow to compromise data
ROP/JOP Attack Mitigation	Prevents a class of potential attacks that use types of application exploits used in the past to compromise processes in execution
Crypto and Entropy Acceleration	Improves performance for RNG, SHA512, SHA3 cryptography algorithms
Single-Key Memory Encryption	Protects memory from being maliciously read by unauthorized actors

AMPEREONE : PRELIMINARY SKU INFORMATION

Processor Model	Core Count	Frequency (GHz)	Usage Power*
AmpereOne® A192-32X	192	3.2	276
AmpereOne® A192-26X	192	2.6	211
AmpereOne® A160-28X	160	2.8	215
AmpereOne® A144-27X	144	2.7	214
AmpereOne® A144-26X	144	2.6	332
AmpereOne® A144-24X	144	2.4	185
AmpereOne® A128-34X	128	3.4	280
AmpereOne® A96-37X	96	3.7	292

** Performance per socket and usage power data based on estimated SPECrate®2017_int_base (GCC13) and are subject to change based on system configuration and other factors. Usage Power is defined as average power consumed over time by a given workload.*

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