



Quad-Core AMD Opteron™ processors for servers and workstations

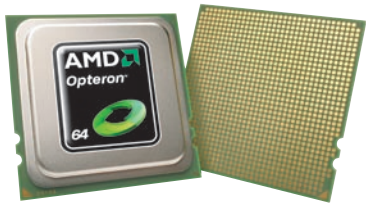
UNCOMPROMISED DESIGN.

UNPRECEDENTED PERFORMANCE-PER-WATT.

As a part of the AMD64 family of processors, the Quad-Core AMD Opteron™ processor with Direct Connect Architecture is designed to meet the demand for stable, long-term solutions, while delivering exceptional energy efficiency, advanced virtualization technology, and outstanding computing performance.

It all starts with the common AMD64 core. Thanks to this evolutionary technology, your business can now seamlessly upgrade from dual- to quad-core performance and beyond without sacrificing your existing investments in hardware, software, and personnel. And the Quad-Core AMD Opteron processor advances AMD's leadership in performance-per-watt. Features like Enhanced AMD PowerNow!™ technology, energy-efficient DDR2 memory, hardware-assisted AMD Virtualization™ (AMD-V™) technology with Rapid Virtualization Indexing, and native multi-core processing help your systems consume less power, emit less heat, take up less space, and ultimately, save money.

AMD is committed to understanding your technology needs and providing solutions that contribute to your business growth. With the AMD Opteron processor, you can be confident knowing you have the right solution to meet your evolving IT needs. AMD provides new and beneficial technology to the enterprise by innovating with open standards, compatibility, and your company's best interests in mind. With the AMD Opteron processor, you gain flexibility for today, and the scalability you need for the future.



ONE ENTERPRISE. ONE PLATFORM.

Our common-core strategy enables seamless upgrades from dual- to quad-core processors and beyond, so you can minimize the cost of transitions and maximize your past IT investments. AMD Opteron processors also feature same socket technology that lets you maintain consistent thermal and power envelopes across multiple computing generations. And with AMD's stable, long-term roadmap, your organization can leverage past investments in Second-Generation AMD Opteron processor-based platforms by upgrading to quad-core today, since it is socket and thermal compatible with just a BIOS update.

The Quad-Core AMD Opteron processor is available in three series: the 8300 series (4P – 8P), the 2300 series (2P), and the 1300 series (1P).*

In addition to standard power processors, each series includes the high-performance AMD Opteron SE processor, which helps provide maximum computing capabilities and increased server longevity, and the low-power AMD Opteron HE processor, which delivers the highest performance-per-watt in power-constrained IT environments, making it ideal for rack-dense servers and datacenter blades.

Access at-a-glance specifications and the complete lineup of AMD Opteron processors at www.amd.com/opteroncomparison

AMD64 WITH DIRECT CONNECT ARCHITECTURE

Direct Connect Architecture helps improve system performance and efficiency by directly connecting the processors, the memory controller, and the I/O to the CPU.

- Designed to enable simultaneous 32- and 64-bit computing
- Minimizes the cost of transition and maximizes current investments
- Integrated DDR2 Memory Controller
 - › Increases application performance by dramatically reducing memory latency
 - › Scales memory bandwidth and performance to match compute needs
- HyperTransport™ technology
 - › Provides up to 24.0GB/s peak bandwidth per processor – reducing I/O bottlenecks
 - › Directly connects CPUs to enable scalability

Learn more at www.amd.com/directconnectarchitecture

Quad-Core AMD Opteron processors feature a native quad-core design. That means instead of “gluing” together two dual-core processors and calling it quad-core, AMD actually designed its processors with four cores on a single processor die, allowing them to communicate more efficiently for improved performance and performance-per-watt. And with a seamless upgrade path from dual-core, Quad-Core AMD Opteron processors are designed to lower total cost of ownership, scale the performance of business applications, and increase capacity without incurring additional costs to the current infrastructure.

NATIVE MULTI-CORE TECHNOLOGY

AMD64 with Direct Connect Architecture was designed from the ground up for multiple cores, resulting in high performance for multi-threaded and multitasking environments.

- Native dual- and quad-core design helps increase the flow of data within the CPU
- Quad-Core AMD Opteron processors operate within the same thermal bands as previous generations of AMD Opteron processors for ease of upgradeability and reduced TCO

Placing two or more powerful computing cores on a single die opens up a world of important new possibilities. Learn more at multicore.amd.com

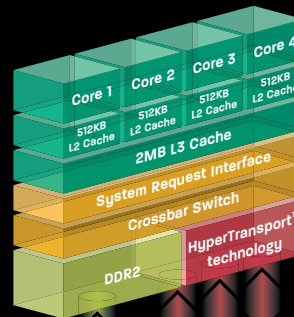
ENHANCED AMD POWERNOW!™ TECHNOLOGY

Independent Dynamic Core Technology

- Allows processors and cores to operate at various voltages and frequencies, depending on usage and workload to reduce TCO and to lower power consumption in the datacenter

Learn more about power-on-demand computing technology from AMD at www.amd.com/powernow

Quad-Core AMD Opteron™ Processor Design for Socket F (1207)



10.7GB/s @ DDR2-667

HyperTransport™ technology links provide up to 24GB/s peak bandwidth

Dual Dynamic Power Management™

- Enables more granular power management capabilities to reduce processor energy consumption
- Separate power planes for cores and memory controller for optimum power consumption and performance, creating more opportunities for power savings within the cores and memory controller

AMD COOLCORE™ TECHNOLOGY

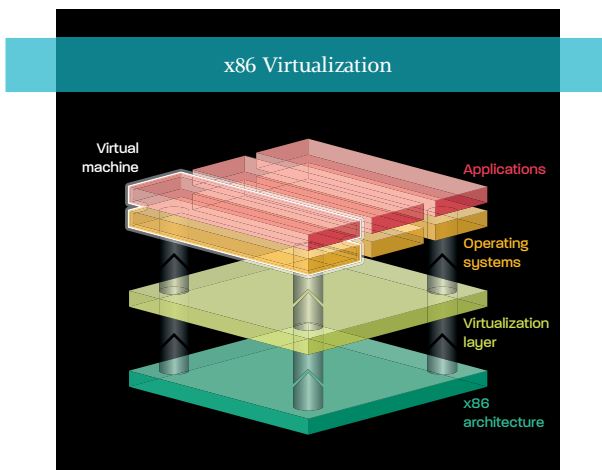
- Reduces processor energy consumption by turning off unused parts of the processor. For example, the memory controller can turn off the write logic when reading from memory, helping reduce system power
- Works automatically without the need for drivers or BIOS enablement
- Power can be switched on or off within a single clock cycle, saving energy with no impact to performance

AMD VIRTUALIZATION™ (AMD-V™) WITH RAPID VIRTUALIZATION INDEXING

Hardware-assisted AMD Virtualization with Rapid Virtualization Indexing provides a balanced approach to help improve virtualization performance, enabling more virtual machines to run per server.

- Designed to greatly increase performance of virtualized applications by allowing virtual machines to directly manage memory with less hypervisor intervention and associated overhead
- Improves the efficiency of switching between virtual machines, helping improve performance
- Effectively isolates virtual machines for secure operation

Learn more at www.amd.com/virtualization



INTEGRATED DDR2 DRAM CONTROLLER WITH AMD MEMORY OPTIMIZER TECHNOLOGY

- High-bandwidth, energy-efficient DDR2 memory
- The low power consumption inherent in DDR2 memory when compared to other technologies helps reduce power and cooling for improved overall TCO
- 128-bit memory channel can be divided into two independent 64-bit memory channels for improving memory access efficiency
- Larger memory buffers for increased throughput
- Write bursting to minimize read/write transitions for greater throughput
- Optimized DRAM paging algorithm for greater throughput
- DRAM prefetcher to intelligently predict and retrieve data needed from main memory
- Core prefetchers can pull data directly from L1 cache to decrease latency and to spare L2

AMD BALANCED SMART CACHE

- Large shared L3 cache shares data between cores efficiently while helping reduce latency to main memory
- Dedicated L1 and L2 cache per core helps performance of virtualized environments and large databases by reducing cache pollution associated with a shared L2 cache
- The L1 cache of AMD Opteron processors can handle double the number of loads per cycle as Second-Generation AMD Opteron processors to help keep CPU cores busy

AMD WIDE FLOATING POINT ACCELERATOR

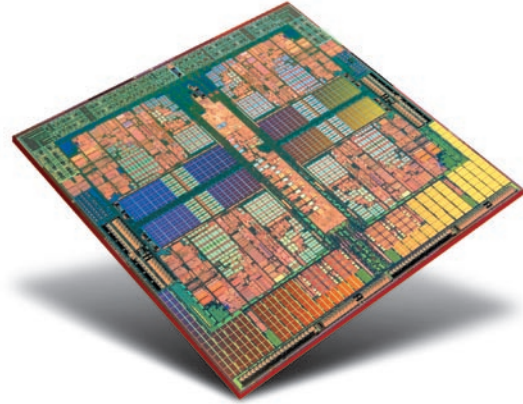
- 128-bit SSE floating-point capabilities enable each processor core to simultaneously execute four flops per clock (four times the floating-point capabilities of previous AMD Opteron processors) for significantly improved performance in compute-intensive and workstation applications
- Instruction fetch bandwidth, data-cache bandwidth, and memory-controller-to-cache bandwidth have all been doubled over previous generations of AMD Opteron processors to help keep the 128-bit floating-point pipeline full support for misaligned SSE instructions

HYPERTRANSPORT™ TECHNOLOGY

- Provides a scalable bandwidth interconnect between processors, I/O subsystems, and other chipsets
- Support of up to three coherent HyperTransport links, providing up to 24.0GB/s peak bandwidth per processor
- Up to 8.0GB/s bandwidth per HyperTransport link, providing sufficient bandwidth for supporting I/O and interconnect technologies including PCI Express, PCI-X, InfiniBand, and 10G Ethernet
- Low voltage (1.2 volts) and power consumption to help reduce a system's thermal budget

Other features of the Quad-Core AMD Opteron™ processor include:

- IPC enhanced CPU cores with advanced branch prediction and out-of-order load execution
- Physical memory support increased to 48-bit
- ECC (Error Correcting Code) protection for L1, L2, and L3 cache data, L2 cache data and tags, L3 cache data and tags, and DRAM with hardware scrubbing of all ECC protected arrays
- 65nm SOI (Silicon on Insulator) process technology can lower thermal output levels and improve frequency scaling
- Support for SSE, SSE2, SSE3, and SSE4a instructions



With AMD, you can achieve a greater return on investment by leveraging an industry-standard architecture and infrastructure that minimizes complexities and simplifies management. That's because Quad-Core AMD Opteron™ processors with Direct Connect Architecture enable one platform to meet the needs of multitasking and multi-threading environments — now and in the future.

FEATURE	BENEFIT
Independent Dynamic Core Technology	Reduces processor energy consumption by adjusting power usage of each core
Dual Dynamic Power Management™	Reduces processor energy consumption by creating more power saving opportunities
AMD CoolCore™ technology	Reduces processor energy consumption by turning off unused parts of the processor
Rapid Virtualization Indexing	Increased performance and efficiency for many virtual workloads, allowing for a higher performing, more flexible IT environment
AMD Memory Optimizer technology	Optimized memory bandwidth improves performance of multi-threaded software environments
AMD Balanced Smart Cache	Improves core efficiency for better support of multi-threaded software environments
AMD Wide Floating Point Accelerator	Greatly improves performance on HPC and workstation workloads, reducing job times



FOR MORE INFORMATION, VISIT WWW.AMD.COM/OPTERON

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43753A

One AMD Place
Sunnyvale, CA 94088
(800) 538-8450

