



## Quad-Core AMD Opteron™ Processors for Servers and Workstations

### OFFERING SUPERIOR VIRTUALIZATION PERFORMANCE

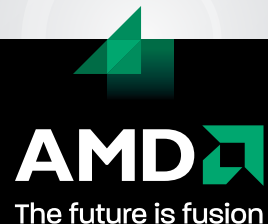
Building on the strengths of the original Quad-Core AMD Opteron™ processor, the new Quad-Core AMD Opteron™ processor represents the most thermally efficient, highest performing server and workstation processor that AMD has ever produced – while further enhancing AMD's already leading capabilities for efficient server virtualization.

Thanks to this evolutionary technology, your business can now seamlessly upgrade from previous generations of AMD Opteron™ processors 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, and hardware-assisted AMD Virtualization™ (AMD-V™) technology with Rapid Virtualization Indexing work together to enable systems that can help you 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 previous generations of AMD Opteron™ processors\* to help you minimize the cost of transitions and maximize your past IT investments. Quad-Core 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- and Third-Generation AMD Opteron™ processor-based platforms by upgrading to new quad-core today, since it is socket and thermal compatible with just a BIOS update.

In addition to standard power processors, each series includes the high-performance AMD Opteron™ SE processor, which helps provide maximum computing capabilities, and the low-power AMD Opteron™ HE processor, which delivers higher 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](http://www.amd.com/opteroncomparison)**

## 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
- Helps minimize the cost of transition and maximize current investments
- Integrated DDR2 Memory Controller
  - › Helps increase application performance and reduce memory latency
  - › Scales memory bandwidth and performance to match compute needs
- HyperTransport™ technology
  - › Provides up to 24.0GB/s peak bandwidth per processor – reducing traditional front-side bus I/O bottlenecks
  - › Directly connects CPUs to enable scalability

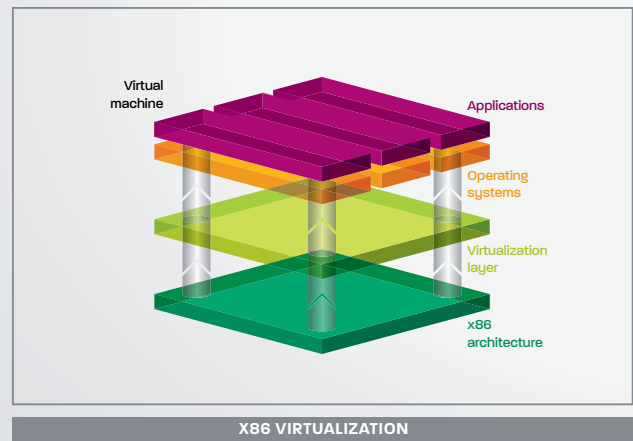
**Learn more at [www.amd.com/directconnectarchitecture](http://www.amd.com/directconnectarchitecture)**

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

Hardware-assisted AMD Virtualization™ with Rapid Virtualization Indexing – further enhanced with new Quad-Core AMD Opteron™ processors – provides a balanced approach to help improve virtualization performance, enabling more virtual machines to run per server.

- Designed to greatly increase performance of many 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
- AMD Extended Migration provides full live migration compatibility between single-core through quad-core AMD Opteron™ processor-based servers, enabling a more reliable, more adaptable IT environment

**Learn more at [www.amd.com/virtualization](http://www.amd.com/virtualization)**



\*Socket F (1207) compatible CPUs

## AMD SMART FETCH TECHNOLOGY

- Helps reduce CPU power consumption by up to 21% during processing idle times by putting cores into a “halt” state.
- Other cores have full access to the L1 and L2 cache of the “halted” cores, allowing for reduced CPU power consumption with full CPU performance.

## ENHANCED AMD POWERNOW!™ TECHNOLOGY

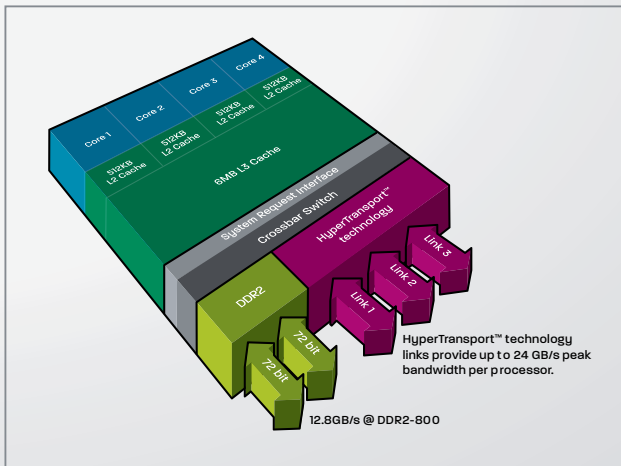
### Independent Dynamic Core Technology

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

Learn more about power-on-demand computing technology from AMD at [www.amd.com/powernow](http://www.amd.com/powernow)

## 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



QUAD-CORE AMD OPTERON™ PROCESSOR DESIGN FOR SOCKET F (1207)

## AMD COOLCORE™ TECHNOLOGY

- Reduces processor energy consumption by reducing power to unused parts of the processor and to the memory controller when not in use, helping reduce system power consumption
- 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

## INTEGRATED MEMORY CONTROLLER WITH AMD MEMORY OPTIMIZER TECHNOLOGY

- 128-bit memory channel can be divided into two independent 64-bit memory channels for improving memory access efficiency

## AMD BALANCED SMART CACHE

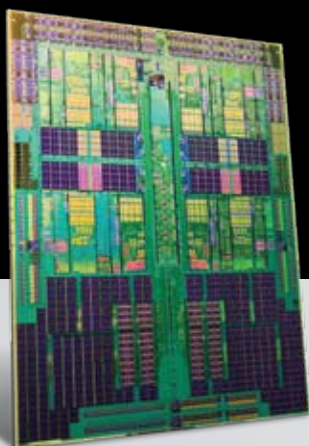
- Large shared L3 cache shares data between cores efficiently while helping reduce latency to main memory
- L3 cache expanded to 6M, offering twice the total cache of previous generations of Quad-Core AMD Opteron™ processors
- Dedicated L1 and L2 cache per core helps performance of virtualized environments and large databases by reducing cache pollution associated with a shared L2 cache
- The L1 cache of AMD Opteron™ processors can handle more loads per cycle than 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 Second-Generation AMD Opteron™ processors) for significantly improved performance in compute-intensive and workstation applications

# 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
- 45nm SOI (Silicon on Insulator) process technology with immersion lithography can help lower thermal output levels and improve frequency compared to previous generations of AMD Opteron™ processors
- Support for SSE, SSE2, SSE3, and SSE4a instructions

AMD can help you achieve a greater return on investment by allowing you to leverage 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
AMD Smart Fetch Technology	Can reduce CPU power consumption by up to 21% during process idle times
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

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