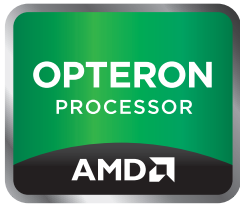


AMD Opteron™ 4200 Series Processor Quick Reference Guide

The world's lowest power x86 cloud processor¹ just got more efficient

AMD Opteron™ 4200 Series Processor



KEY FEATURES

- **New Core Architecture** — drives more core density and greater throughput
- **AMD Turbo CORE Technology** — allows processors to independently boost their clock speeds, scaling frequency up 300MHz-1.2GHz automatically to respond to the need for more application performance²
- **C6 Power State** — reduces processor power consumption at active idle by up to 39%³
- **AMD Virtualization™ (AMD-V™) Technology 2.0** — heightens virtualization efficiency with new enhancements to the AMD-V™ suite of virtualization to optimize data center rack space and help minimize management tasks

END USER BENEFITS

Designed for enterprise workloads while still delivering a performance punch

- A 33% increase in core count packs in plenty of processing performance into a smaller, more efficient, 8-core design while maintaining very aggressive power/thermal ranges^{4,5}
- Power per core that shatters the 5W/core mark, a new record for an enterprise-class x86 processor¹
- New power management capabilities allow for larger parts of the processor to be almost completely powered off when not being used, dramatically reducing idle core power consumption by up to 39% over the previous generation of processors and allowing active cores to run at a higher frequency³
- AMD Turbo CORE technology takes advantage of additional power headroom to digitally boost all cores simultaneously by up to 300MHz and can boost up to 1.2GHz when only half of the cores are active², allowing applications to finish tasks quickly and return to lower power states
- Straight-through computing helps ensure that there are not bottlenecks or compromises as up to eight threads get their own dedicated core when workload demands increase with maximum memory channel and I/O speed (across all SKUs/price points) helping to ensure that there are no bottlenecks or feature compromises unlike Intel, who purposely throttles down capabilities

Delivering new levels of enterprise scalability for demanding cloud applications and SMB/Infrastructure applications

- Scale your cloud workload with up to 8 cores in a low power processor

- Efficiently scales performance/watt based on the innovative modular design and aggressive power capabilities
- New power saving features, like TDP Power Cap, put the customer in control of more aspects of power efficiency than ever before on AMD Opteron™ processor-based servers
- Up to 8 cores and more processing throughput⁶ than the previous generation helps your cloud easily scale within the most fluid and spiky processing environments, easily responding to the elastic needs of clouds

Bringing unparalleled efficiency to your processing, power and financial budgets

- The lowest enterprise-class power per core with up to 8 cores in only 35W of power, shattering the previous record¹
- 32nm design and a smaller die⁴ drive more efficiency at the processor level to help ensure you are maximizing your performance per watt per square foot
- Virtualized infrastructure deployments can enjoy 33% more VMs in the same power and thermal ranges⁵ thanks to the new AMD-V™ virtualization features, allowing small/medium businesses to grow with their business needs on a single virtualized platform
- New instructions make processing technical software commands more efficient, allowing for more computing per cycle, which helps drive down processing requirements so that web/cloud applications can more easily process their workload and return to lower power states
- Easy on your budget through both unprecedented value and low power consumption, helping hold down not only acquisition costs but also the long-term total cost of ownership

¹ As of March 16, 2012 AMD Opteron™ processor Models 4200 EE have the lowest known power per core of any x86 server processor, at 35W TDP (35W/8 = 4.375W/core). Intel's lowest power per core server processor, Intel Xeon E5-2650L, is 70W TDP (70W/8 = 8.75W/core). See www.intel.com/pricelist.cfm as of 3/16/12. Previous record held by AMD Opteron processor Models 4100 EE at 35W TDP / 6 cores = 5.83 W/core. SVR-58

² AMD Opteron 4200 Series processors experience all core boost of up to 300 MHz (P2 base to P1 boost state) and up to 12 GHz max turbo boost (half or fewer cores boost from P2 to P0 boost state). SVR-63

³ Based on testing in AMD Performance Labs as of March 2012, an AMD Opteron™ processor model 4174 (6-core 2.5GHz) consumes 6.47W in the active idle C1E power state while an AMD Opteron™ processor model 4284 (8-core 3.0GHz) consumes only 3.977W in the active idle C1E power state with new C6 power gating employed. System configuration: "Kruger-P" reference design kit, 32GB (4x 8GB DDR3-1066) memory, Seagate ST3500413AS SATA disk drive, Microsoft® Windows Server 2008 x84 Enterprise Edition R2 SP1 SVR-62

⁴ Based on AMD Opteron 4100 Series processor at 346 mm² vs. AMD Opteron 4200 Series processor at 318mm². SVR-64

⁵ Based on 8-core AMD Opteron 4200 Series processors at 35W, 65W and 95W TDP compared to 6-core AMD Opteron 4100 Series processors at 35W, 65W and 95W TDP when utilizing the 1 VM per core loading rule. SVR-59

⁶ SPEC and SPECint are registered trademarks of the Standard Performance Evaluation Corporation. The results reflect results published on <http://www.spec.org/cpu2006/results/> as of 4/12/12. The comparison presented above is based on the best performing two-socket servers using AMD Opteron™ processor Models 4184 and 4284. For the latest SPECint[®]_rate2006 results, visit <http://www.spec.org/cpu2006/results/>. 285 using 2 x AMD Opteron™ processors Model 4284 in Dell PowerEdge R515 server, 32 GB (4 x 8 GB 2Rx4 PC3-12800R-1L ECC), Red Hat Enterprise Linux[®] Server release 6.1, Kernel 2.6.32-131.0.15.el6.x86_64, C/C++: Version 4.2.5.2 of x86 Open64 Compiler Suite (from AMD), <http://www.spec.org/cpu2006/results/res2011q4/cpu2006-20111206-19137.html>; 237 using 2 x AMD Opteron™ processors Model 4184 in Dell PowerEdge R415 server, 32GB (8 x 4GB DDR3-1333) memory, SUSE Linux[®] Enterprise Server 11, x86 Open64 4.2.4 Compiler Suite, <http://www.spec.org/cpu2006/results/res2010q4/cpu2006-20100927-13463.html>. SVR-120

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AMD Opteron™ 4200 Series Processor Product Specifications

Model Number	Core Count	Core Frequency	All Core Boost Frequency	AMD Turbo CORE Max Frequency	L2 Cache	L3 Cache	TDP
4284	8	3.0 GHz	3.3 GHz	3.7 GHz	4 x 2 MB	8 MB	95W
4280	8	2.8 GHz	3.1 GHz	3.5 GHz	4 x 2 MB	8 MB	95W
4276 HE*	8	2.6 GHz	2.9 GHz	3.6 GHz	4 x 2 MB	8 MB	65W
4274 HE	8	2.5 GHz	2.8 GHz	3.5 GHz	4 x 2 MB	8 MB	65W
4256 EE	8	1.6 GHz	1.9 GHz	2.8 GHz	3 x 2 MB	8 MB	35W
4240*	6	3.4 GHz	3.6 GHz	3.8 GHz	3 x 2 MB	8 MB	95W
4238	6	3.3 GHz	3.5 GHz	3.7 GHz	3 x 2 MB	8 MB	95W
4234	6	3.1 GHz	3.3 GHz	3.5 GHz	3 x 2 MB	8 MB	95W
4230 HE*	6	2.9 GHz	3.2 GHz	3.7 GHz	3 x 2 MB	8 MB	65W
4228 HE	6	2.8 GHz	3.1 GHz	3.6 GHz	3 x 2 MB	8 MB	65W
4226	6	2.7 GHz	2.9 GHz	3.1 GHz	3 x 2 MB	8 MB	95W

*New SKUs available with Speed Bump Launch 2012

AMD Opteron™ 4200 Series Processor Product Specifications

Cache Sizes	Total Cache: 16MB (8 core), 14MB (6 core) L1 Cache: 16KB/core + 64 KB instruction/module L2 Cache: 1MB (per core) L3 Cache: 8MB (per socket)
Process Technology	32-nanometer SOI (silicon-on-insulator) technology
HyperTransport™ Technology 3.0	2X HT3 links with peak bandwidth of 6.4 GT/s per link
Memory	Integrated DDR3 memory controller — Up to 51.2 GB/s memory bandwidth per CPU for Socket C32
Number of Channels/Types of Memory	Dual channel support for U/RDDR3 up to DDR3-1600 and ULV (1.25V) RDDR3 up to DDR3-1333
Die Size	316 mm ²
Packaging	Socket C32 — 1207 Organic Land Grid Array (OLGA)

AMD SR5650, SR5670, SR5690 I/O Hub Product Specifications

Model Number	Processor Interface	PCI Express®	Number of PCIe® Ports/engines	Virtualization	Error Detection/Isolation	Max TDP/Idle (w/c1e)	Process Technology	Package
SR5650	HyperTransport™ 3.0 technology (5.2GT/s)	v2.0	22 lanes/8 engines	AMD-Vi (IOMMU 1.26)	HyperTransport error handling, PCIe® Advanced Error Reporting, PCIe® end-to-end Cycle Redundancy Check	12.6W/ 5.4W	TSMC 65nm	29 x 29mm FCBGA
SR5670	HyperTransport™ 3.0 technology (5.2GT/s)	v2.0	30 lanes/9 engines	AMD-Vi (IOMMU 1.26)	HyperTransport error handling, PCIe® Advanced Error Reporting, PCIe® end-to-end Cycle Redundancy Check	15.4W/ 5.75W	TSMC 65nm	29 x 29mm FCBGA
SR5690	HyperTransport™ 3.0 technology (5.2GT/s)	v2.0	42 lanes/11 engines	AMD-Vi (IOMMU 1.26)	HyperTransport error handling, PCIe® Advanced Error Reporting, PCIe® end-to-end Cycle Redundancy Check	18W/6.15W	TSMC 65nm	29 x 29mm FCBGA

AMD SP5100 Southbridge Product Specifications

USB Ports	12 USB 2.0 + 2 USB 1.1
PCI Bus Support	PCI rev 2.3
Serial ATA	AHCI 1.1 SATA 3.0Gb/s with SW RAID Support
SATA Ports	6 (can be independently disabled)
Max TDP/Idle	4W/1W
Process Technology	TSMC .13um
Package	528 ball FCBGA, 21x21mm, 0.8mm pitch

