OPTERON
EMBEDDED
AMD

The Six-Core AMD Opteron™ Processor for Embedded Enterprise Designs

LEVERAGE YOUR PLATFORM INVESTMENT WITH A SEAMLESS UPGRADE TO A SIX-CORE AMD OPTERON PROCESSOR!

The Six-Core AMD Opteron™ Processor provides up to 30% more performance in the same socket 1207 footprint than previous generation quad-core AMD Opteron processors. This upgrade enables a performance improvement for edge-of-enterprise markets including storage and telecommunication as well as more traditional embedded markets including storage and telecommunication as well as more traditional embedded markets such as security and medical imaging, military systems, and single-board computing. AMD64 technology with Direct Connect Architecture helps provide a balanced foundation for embedded systems. Based on the industry-standard x86 platform, AMD64 delivers the right match of processing power, memory performance, I/O throughput, and scalability. Add the vision of 32- and 64-bit application support with native multi-core computing in a consistent thermal envelope and many embedded designers are finding their AMD Opteron processor-based next-generation systems deliver superior application performance.

WHAT CAN A LEADING PROCESSOR PLATFORM OFFER?

AMD Opteron processors with Direct Connect Architecture can help improve overall system performance and efficiency by helping eliminate traditional bottlenecks inherent in architectures where traditional front-side buses restrict and interrupt the flow of data. With AMD Opteron processors, there are no front-side buses. Instead, the processors, memory, and I/O are directly connected to the CPU. Further, the integrated memory controller helps reduce memory latency while HyperTransport™ technology delivers a very high I/O bandwidth. The Six-Core AMD Opteron Processor implements a HyperTransport™ technology HT Assist that optimizes communication between processors to improve multi-processor systems. Data speeds through the system without encountering the traditional frontside bus bottleneck of competing x86 platforms. In addition to the architectural benefits inherent in Direct Connect Architecture,

The AMD Opteron processor offers the following unique advantages for high-end embedded systems:

> **HyperTransport™ technology** provides up to 17.6GB/s per link in HT 3.0 generation, and is compatible with HT 1.0 generation implementation
> **HyperTransport™ technology HT Assist** optimizes communication between processors to improve multi-processor systems
> **On-die integrated DDR2 memory controller** offers available memory bandwidth up to 12.8GB/s (with DDR2-800) per processor
> **Hardware assisted AMD Virtualization™ technology** in AMD Opteron processors with DDR2 helps streamline the efficiency of multiple servers and provides virtual machine memory isolation for improved security
> **Socket F (1207)** provides system upgrade option from dual-core to quad-core to six-core in the same physical footprint

Dual Dynamic Power Management (DDPM)
> Allows for independent voltage control between the CPU cores and memory controller
> Optimizes memory bandwidth to help improve system performance
> Helps reduce system power consumption and heat generation

AMD CoolCore™ Technology
> Reduces processor energy consumption by turning off unused parts of the processor
> Helps reduce power and cooling costs by lowering the energy consumption of the platform design

Reliable, scalable

It's a fact that reliability is key in selecting embedded system components. AMD Opteron processors are NEBS-friendly – either with higher Tcase or P-State control – supporting telecommunications industry requirements for reliability. AMD64 technology provides features like Error Correcting Code (ECC) and JTAG interfaces for effective debug during system development. Additionally, Direct Connect Architecture requires fewer chips on the motherboard, further enhancing a system's overall reliability.

The AMD Opteron processor provides unique scalability options with glueless multi-processing from one socket (2, 4 or 6 core) to 8 socket systems. This, combined with AMD64's reliability, helps deliver an embedded design that can provide customers a longrange plan for the life cycle of their systems.

Beyond outstanding processors: Longevity, exceptional design support, quick time to market
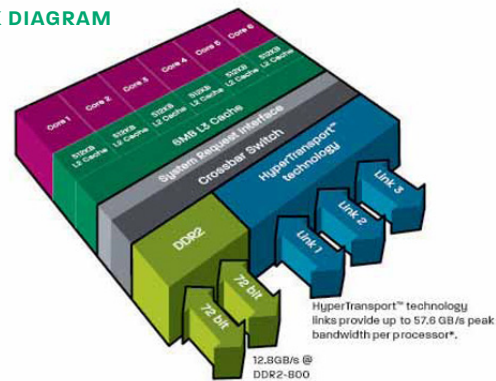
The AMD64 Longevity Program is designed so that the high performance processors you select for an embedded design will be available when you need them. AMD understands the unique requirements of the embedded market and our AMD64 Longevity Program is in place to maximize the available choice of leading edge x86 processors – delivering a wide range of performance, power, thermal, and packaging features.

AMD has a strong design support program in place. From Reference Design Kits (RDKs) to extensive and readily available documentation to a suite of leading debug tools, our goal is to make your design cycle quick and efficient, and to help you get your embedded products on the market quickly. Add this to the improved time to market achieved with utilizing commercial off-the-shelf products like the industry-standard x86 AMD Opteron processor.

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AMD Opteron™ Processor Model	Order Part Number (OPN) Identifier	Core Frequency	Cache	Peak Power (worst case TDP)
Six-Core AMD Opteron™ Processors Socket F (1207)/Lidded 1207 pad LGA package				
84QS	OE84QSWJS6DGNE	2.4GHz	L2: 512KB (x6) L3: 6MB	115W
24QS	OE24QSWJS6DGNE	2.4GHz		115W
84KS	OE84KSPDS6DGNE	2.0GHz		79W
24KS	OE24KSPDS6DGNE	2.0GHz		79W
14KS	OE14KSPDS6DGNE	2.0GHz		79W
Quad-Core AMD Opteron™ Processors Socket F (1207)/Lidded 1207 pad LGA package				
83VS	OE83VSWHP4DGIE	2.8GHz	L2: 512KB (x4) L3: 6MB	115W
83QS HE	OE83QSMAP4DGIE	2.4GHz		71W
23VS	OE23VSWHP4DGIE	2.8GHz		115W
23QS HE	OE23QSMAP4DGIE	2.4GHz		71W
23KS EE	OE23KSFLP4DGIE	2.0GHz		50W
13QS HE	OE13QSMAP4DGIE	2.4GHz		71W
13KS EE	OE13KSFLP4DGIE	2.0GHz		50W
Dual-Core AMD Opteron™ Processors Socket F (1207)/Lidded 1207 pad LGA package				
8214 HE	OSP8214GAU6CYE	2.2GHz	L2: 1MB (x2)	68W
8210 EE	OSH8210GAS6CYE	1.8GHz		45W
2214 HE	OSP2214GAU6CXE	2.2GHz		68W
2210 EE	OSH2210GAS6CXE	1.8GHz		45W
2208 HE	OSP2208GAA5CXE	1.8GHz		68W
1214 HE	OSP1214GAU6DGE	2.2GHz		68W
1210 EE	OSH1210GAS6DGE	1.8GHz		45W
Single-Core AMD Opteron™ Processor Socket F (1207)/Lidded 1207 pad LGA package				
2204 HE	OSH2204GAA4DTE	1.8GHz	L2: 512KB (x1)	45W

BLOCK DIAGRAM

HyperTransport™ technology links provide up to 57.6 GB/s peak bandwidth per processor*.

12.8GB/s @ DDR2-800

WHAT ABOUT PERFORMANCE-PER-WATT?

It's a growing concern from the data center to embedded systems – how to increase computing performance without incurring excess power draw, additional cooling requirements, or taking up more space in either real estate or form factor. AMD was first to recognize that the processor could offer part of the solution in reducing total cost of ownership.

> **Microprocessor architecture** – AMD64 processor design helps reduce the overall system power budget with integration of the NorthBridge, while multi-core processors are designed to offer increased performance, with higher compute density and scalability

> **Low power processors** – AMD provides a consistent roadmap with a variety of wattage options

> **Low operational costs** – Reduced power draw and heat dissipation means low data center energy costs. Features like AMD PowerNow!™ technology with Optimized Power Management help deliver performance on demand and helps minimize power consumption

> **AMD Opteron processors with DDR2** support offer a seamless upgrade path from dual-core to quad-core to six-core computing with minimum impact to power and thermal consideration

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