intel® Leap ahead™

Dual-Core Intel® Xeon® Processors LV and ULV for Embedded Computing

Product Overview

Dual-Core Intel® Xeon® processors LV and ULV are members of Intel's growing product line of multi-core processors, utilizing Intel's 65nm process technology to integrate two cores, along with many advanced features, into one physical package. With a thermal design power (TDP) of 31W (LV) and 15W (ULV), these processors combine the benefits of two high-performance execution cores with intelligent power management features to deliver significantly greater performance-per-watt over previous single-core Intel® Xeon® processors.

Available in three speeds – 2.16 GHz (LV), 2.0 GHz (LV) and 1.66 GHz (LV and ULV) – these dual-core processors are ideal for a wide range of low-power embedded, storage and communications applications such as storage area networks (SAN), network attached storage (NAS), routers, virtual private networks (VPN), ruggedized small form factor systems, intrusion detection systems, and telecommunications (wireless and wireline) servers, particularly in AdvancedTCA* form-factor designs. While incorporating advanced processor technology, they remain software-compatible with previous IA-32 processors.
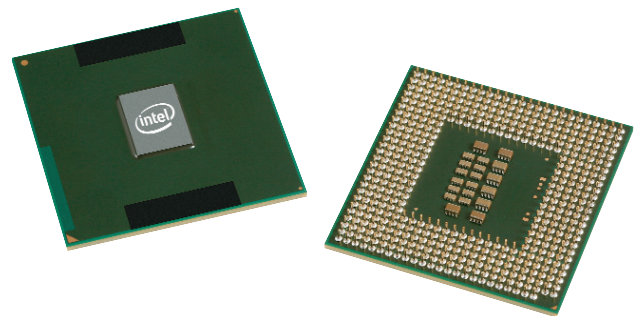
Product Highlights

Intel's comprehensive processor/chipset validation process enables fast deployment of next-generation platforms to help developers maximize competitive advantage while minimizing development risks. Dual-Core Intel Xeon processors LV and ULV are validated with the following:
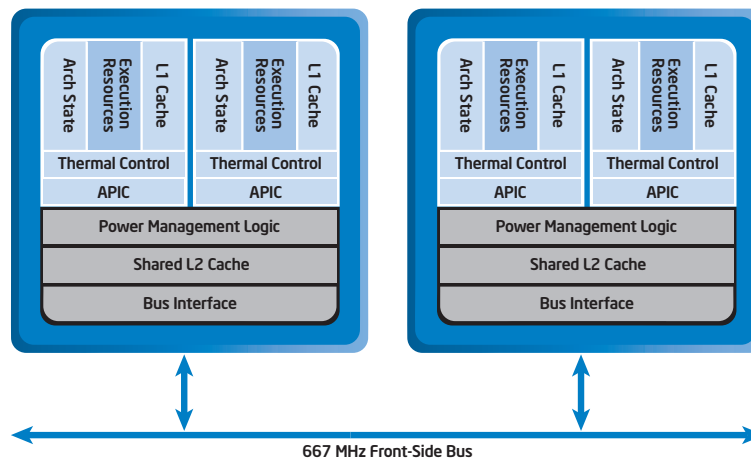
Figure 1: Dual-processor configuration for Dual-Core Intel® Xeon® processors LV and ULV, supported by the Intel® E7520 chipset, provides four high-performance cores per platform.

Product Highlights (continued)

- Intel® E7520 chipset, featuring high bandwidth for increased memory and I/O throughput with dual-processor support, providing four high-performance cores per platform (see Figure 1).

- Intel® 3100 chipset, providing a single chip system controller. This integrated chipset combines the Memory Controller Hub (MCH) and I/O Controller Hub (ICH) into a single component, significantly conserving board real-estate and power consumption.

- Two complete execution cores in one processor package provide advancements in simultaneous computing such as multi-threaded applications and multi-tasking environments. Dual-core processing efficiently delivers performance while balancing power requirements.

- High-performance front-side bus (FSB) provides dual-processor support for demanding high-performance, volume applications. Combined with dual-core processing, this supports up to four simultaneous threads on the system.

- Enhanced Intel SpeedStep® technology allows a system to dynamically adjust processor voltage and core frequency, decreasing average power consumption and average heat production.

- Intel® Smart Cache Design allows two execution cores to share 2 MB of L2 cache, reducing FSB traffic and enhancing system responsiveness.

- Intel® Advanced Thermal Manager supports new digital temperature sensors and thermal monitors on each execution core to enhance thermal monitoring accuracy.

- Streaming SIMD Extensions 3 (SSE3) provides significant performance enhancement for multi-media applications. Additional instructions designed to improve thread synchronization, complex arithmetic, graphics, and video encoding.

- Fully code compatible with existing Intel® architecture-based 32-bit application software.

- Utilizing Intel® Dynamic Power Coordination, application software or operating system can change the sleep state of each execution core, allowing the platform to balance performance and power dissipation.

- FSB address, data, and response parity protection provides a key reliability and data integrity feature for the communications, storage, and other embedded market segments.

- Enhanced 36-bit memory addressing supports up to 16 GB of DDR2 memory, when paired with the Intel E7520 chipset.

- Embedded lifecycle support protects system investment by enabling extended product availability.

- Along with a strong ecosystem of hardware and software vendors, including members of the Intel® Communications Alliance (intel.com/go/ica), Intel helps developers cost-effectively meet design challenges and shorten time-to-market.

Benchmark Tests Demonstrate Improvements in Performance and Performance-per-Watt

Dual-core LV and ULV processors versus single-core LV processors

The Dual-Core Intel® Xeon® processor LV 2.0 GHz can provide a greater than 2x performance gain, and the Dual-Core Intel Xeon processor ULV 1.66 GHz can provide a greater than 1.9x performance gain, compared to the single-core LV Intel® Xeon® processor 2.8 GHz (see Figure 2). Due to lower thermal dissipation, the Dual-Core Intel Xeon processor LV 2.0 GHz can deliver a 4x improvement in performance/watt, and the Dual-Core Intel Xeon processor ULV 1.66 GHz can deliver a 7.1x improvement in performance/watt, compared to the single-core LV Intel Xeon processor 2.8 GHz (see Figure 3).

Figure 2: Relative Performance (Specint_rate_base2000)[1,2]
Source: Intel Corporation
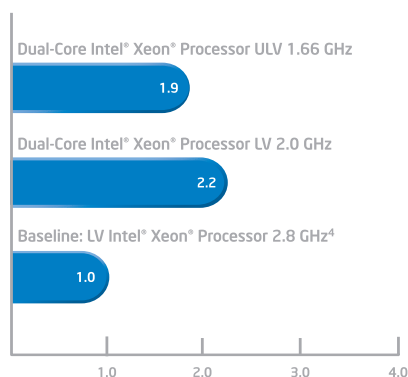
Figure 3: Relative Performance/Watt (Specint_rate_base2000/TDP)[1,2,3]
Source: Intel Corporation
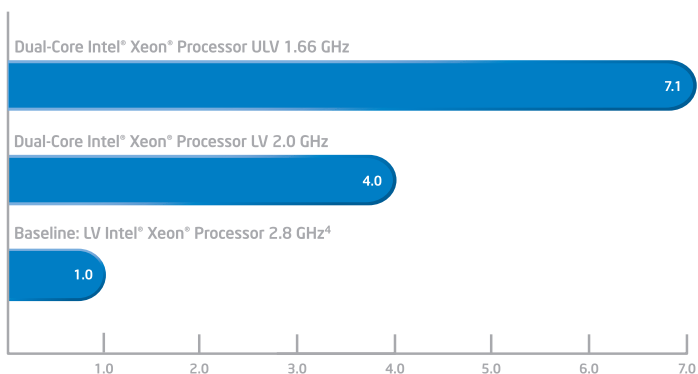
[1] Platform Configurations:

- Two Dual-Core Intel Xeon Processors LV 2.0 GHz, Intel E7520 Memory Controller Hub, DDR2-400 MHz, 8 DIMMS, each with 512 MB memory. (Dual-Core Intel® Xeon® Processor LV with Intel® E7520 Chipset Development Kit).

- Two Low Voltage Intel Xeon Processors with 800 MHz System Bus, Intel E7520 Memory Controller Hub, DDR2-400 MHz, 8 DIMMS, each with 256 MB memory. (Intel® Xeon® Processor with 800 MHz system bus, Intel® E7520 Chipset, and Intel® 6300ESB ICH Development Kit). Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel product as measured by those tests. Any difference in system hardware or software design configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit http://www.intel.com/performance/resources/limits.htm

[2] SPEC CPU2000 benchmark tests reflect the performance of the microprocessor, memory architecture, and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark test results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessors in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering for purchase. For more information about SPEC CPU2000, visit http://www.intel.com/performance/resources/limits.htm

[3] Performance/watt reflects the Spec CPU2000 benchmark test results (as described above), divided by Thermal Design Power (TDP) for the respective processors. For the Dual-Core Intel Xeon Processor LV 2.0 GHz, TDP is specified at 31W. For the Low Voltage Intel Xeon Processor with 800 MHz System Bus, TDP is specified at 55W.

[4] Intel branded product name for "LV Intel Xeon Processor 2.8 GHz" is Low Voltage Intel Xeon Processor with 800 MHz System Bus.

Dual-Core Intel® Xeon® Processor LV for Dual-Processor Embedded Computing

Product Number	Core Speed	Front-Side Bus Speed	L2 Cache	Thermal Design Power	VID	Tjunction	Package
LF80539KF0482M	2.16 GHz	667 MHz	2M	31W	0.825V – 1.275V	0-100° C	478 µFC-PGA
LF80539KF0412M	2.0 GHz	667 MHz	2M	31W	0.825V – 1.275V	0-100° C	478 µFC-PGA
LF80539KF0282M	1.66 GHz	667 MHz	2M	31W	0.825V – 1.275V	0-100° C	478 µFC-PGA

Dual-Core Intel® Xeon® Processor ULV for Dual-Processor Embedded Computing

Product Number	Core Speed	Front-Side Bus Speed	L2 Cache	Thermal Design Power	VID	Tjunction	Package
LF80539JF0282M	1.66 GHz	667 MHz	2M	15W	0.825V – 1.2125V	0-100° C	478 µFC-PGA

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