



Intel® Pentium® D Processor

Delivering Power and Performance for Advanced Users

Product Description

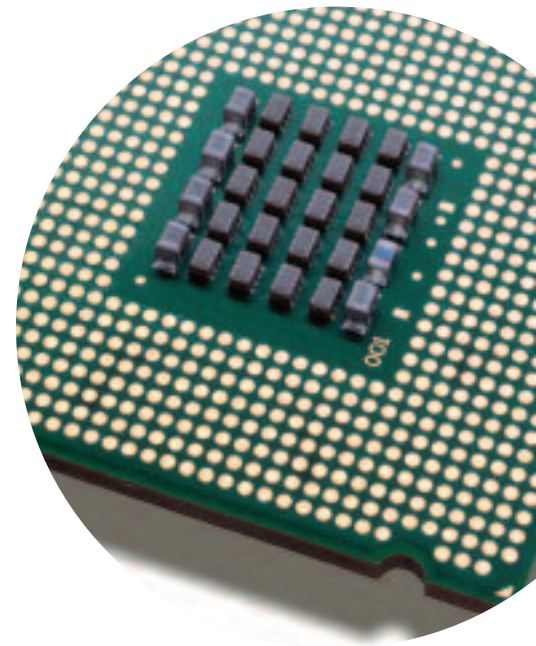
Whether performing video editing, playing graphic intensive games or running multiple background tasks simultaneously, users today have high expectations for their PC performance with little tolerance for degradation in experience. For people who run multiple demanding applications simultaneously, the Intel® Pentium® D processor is Intel's preferred desktop processor. Because it is powered by two execution cores in one processor it offers exceptional functionality and performance so consumers get the most productivity and enjoyment from their PCs when one or more people are running multiple applications at the same time.

In today's usage environment, processor speed alone is not enough to ensure a great experience. Today users require the power of simultaneous computing found in a dual-core processor. The Intel Pentium D processor brings this power to the desktop at three performance levels [3.20, 3 and 2.80 GHz].

An Intel dual-core processor delivers consumer value by providing additional computing resources that expand the PC's capabilities and provide platform-level advancements for consumers in the form of higher throughput and simultaneous computing. With an Intel Pentium D processor users may perform multiple tasks such as digital rendering and gaming all while running virus scan or other background tasks seamlessly.

How is Dual-Core Processing Different from Hyper-Threading Technology?'

The Intel dual-core processor is an evolution of HT Technology. Both HT Technology and a dual-core processor enable a multi-threaded experience for applications written to take advantage of multiple threads, but dual-core processing brings more resources and computing throughput to the PC. Dual-core processing allows for true simultaneous computing so multiple users can access and enjoy the same PC, even from different rooms with a home network and networked devices (such as a stereo connected via a DMA). For more information about the evolution of Hyper-Threading Technology to Dual-Core please see the Dual-Core Demo posted on the Intel Pentium D Processor Web site: www.developer.intel.com/products/processor/pentium_d/index.htm



Intel® Pentium® D Processor

Product Highlights

The Power of Dual-Core Delivers Exceptional Benefits to Your Platform. Intel dual-core processors have two complete execution cores in one processor package running at the same frequency. Both cores share the same packaging and the same interface with the chipset memory. However, they operate as distinct execution cores. Dual-core processing is one way of delivering performance while balancing power requirements.

Enhanced Intel SpeedStep® Technology. Available with the 840 and 830 processors, Enhanced Intel Speedstep Technology allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production. By decreasing power and heat on Desktop PCs, system builders can (depending on system configurations) potentially lower acoustics, and even develop more innovative small form factor designs. Additionally, this feature may help address power concerns in companies with sites approaching the limits of bounded electrical infrastructures. Combined with existing power saving features, Enhanced Intel SpeedStep technology may provide an excellent balance between providing power when you need it and conserving it when you don't.

Level 1 Cache. The Pentium D processor features two 16KB data caches. In addition to the data cache, each core includes an Execution Trace Cache that stores up to 12 K decoded micro-ops in the order of program execution. This can increase performance by removing the decoder from the main execution loop and makes more efficient usage of the cache storage space since instructions that are branched around are not stored.

2MB Level 2 Cache. The Intel Pentium D processor based upon Intel 90nm process technology has a 1MB L2 Advanced Transfer Cache for each core (2MB total) improving overall system performance by allowing each processor core to have faster access to larger amounts of the most often used data.

Intel® Extended Memory 64 Technology (Intel® EM64T)². Intel EM64T provides an enhancement to Intel's 32-bit architecture by enabling the desktop processor platform to access larger amounts of memory. With appropriate 64-bit supporting hardware and software, platforms based on an Intel processor supporting Intel EM64T can enable use of extended virtual and physical memory.

Execute Disable Bit³. This feature, combined with a supported operating system, allows memory to be marked as executable or non-executable. If code attempts to run in non-executable memory the processor raises an error to the operating system.

Streaming SIMD Extensions 3 (SSE3). Single Instruction Multiple Data Extensions significantly accelerates performance of digital media applications and includes additional integer and cache ability instructions that may improve other aspects of performance.

90nm Process Technology. The 90nm process technology is the latest in Intel manufacturing and technology leadership allowing for next generation transistor advantages, such as strained silicon lattice to deliver faster transistors and potentially increased performance.

Features Used for Testing and Performance/Thermal Monitoring

- Built-in Self Test (BIST) provides single stuck-at-fault coverage of the microcode and large logic arrays, as well as testing of the instruction cache, data cache, Translation Lookaside Buffers (TLBs) and ROMs.
- IEEE 1149.1 Standard Test Access Port and Boundary Scan mechanism enables testing of the processor and system connections through a standard interface.
- Internal performance counters for performance monitoring and event counting.
- Includes a thermal monitor feature that allows motherboards to be more cost effective.

Product Performance

The Intel Pentium D processor delivers new levels of performance that end-users can experience and appreciate. With the power and features of the Intel® 945G, Intel® 945P and the Intel® 955X Express Chipsets, this platform provides a high bandwidth PCI Express* interface, dual channel DDR2 memory at 667 MHz, integrated serial ATA controller at 3 Gb/s, Intel® Matrix Storage Technology and Intel® High Definition Audio to deliver an outstanding computing experience.

Platforms built around the Intel Pentium D processor and the Intel 945G/P and 955X Express Chipsets are an ideal solution for the desktop and workstation single user, and even multiple users, giving them the flexibility and performance to handle entertainment and multimedia editing, plus system tasks in the background. For the full spectrum of Intel processor performance, please visit the Intel® Processor Performance Web site at: www.intel.com/performance

Product Specifications

Processor Number ⁴	Speed	Cache Size	Intel® EM64T	Execute Disable Bit ³	Hyper-Threading Technology ¹	Enhanced Intel® Speedstep Technology	Front Side Bus	Package
840	3.20 GHz	2x1MB	Yes	Yes	No	Yes	800	FC-LGA 775
830	3 GHz	2x1MB	Yes	Yes	No	Yes	800	FC-LGA 775
820	2.80 GHz	2x1MB	Yes	Yes	No	No	800	FC-LGA 775

Features and Benefits of the Intel® Pentium® D Processor

Features	Benefits
Dual-core Processor	Provides two execution cores in one physical processor allowing the platform to do more in less time while enjoying smooth interaction with your PC.
Enhanced Intel Speedstep® Technology (Available on 840 and 830 Processors only)	Processor voltage and frequency adjust based on the needs of the application at hand which can result in less power usage and heat production.
Level 1 Cache (Two 16KB Data Caches and Two 12KB Micro-op Execution Trace Caches)	This may increase performance by removing the decoder from the main execution loop of each processing core and makes more efficient usage of the cache storage space since instructions that are branched around are not stored.
2x1 MB Level 2 Cache	Each processor core is equipped with its own 1M cache allowing the execution cores to quickly access data for processing and reducing the amount of Front Side Bus traffic.
800 MHz Front Side Bus	Delivers excellent system bandwidth for maximizing efficiency and improving performance.
Execute Disable Bit	Can help to prevent some classes of viruses and worms that exploit buffer overrun vulnerabilities thus helping to improve the overall security of the system.
Intel® Extended Memory 64 Technology (Intel® EM64T) ²	Processors with Intel EM64T allow platforms to access larger amounts of memory and will support 64-bit extended operating systems from Microsoft, Red Hat and SuSE.
90nm Process Technology	Newest generation manufacturing process with technologies to help increase processor performance.
Streaming SIMD Extensions 3 (SSE3)	Gives your digital media applications an overall boost.

Package and Socket Information

Product	Package
Intel® Pentium® D Processor	FC-LGA4 Package technology plugging into a LGA775 Socket



1. Hyper-Threading Technology requires a computer system with an Intel® Pentium® Processor and an HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See <http://www.intel.com/info/hyperthreading/> for more information including details on which processors support HT Technology.
2. Intel® EM64T requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel EM64T. Processor will not operate (including 32-bit operation) without an Intel EM64T-enabled BIOS. Performance will vary depending on your hardware and software configurations. See www.intel.com/info/em64t for more information including details on which processors support Intel EM64T or consult with your system vendor for more information.
3. Enabling Execute Disable Bit functionality requires a PC with a processor with Execute Disable Bit capability and a supporting operating system. Check with your PC manufacturer on whether your system delivers Execute Disable Bit functionality.
4. Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Over time processor numbers will increment based on changes in clock speed, cache, FSB, or other features and increments are not intended to represent proportional or quantitative increases in any particular feature. Current roadmap processor number progression is not necessarily representative of future roadmaps. See http://www.intel.com/products/processor_number for details.

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