

## Product Brief

### Intel® Core™2 Duo Processors

Embedded Computing



# Intel® Core™2 Duo Processors E6400 and E4300 for Embedded Computing

## Product Overview

Intel® Core™2 Duo processors – members of Intel's growing product line of multi-core processors based on Intel® Core™ microarchitecture – deliver breakthrough energy-efficient performance for embedded platforms. Intel® 65-nanometer (nm) process technology makes it possible to integrate two complete execution cores in one physical package, providing advancements in simultaneous computing for multi-threaded applications and multi-tasking environments. The new Intel Core microarchitecture and increased front-side bus speed provide increased throughput over previous generations for faster data transfer between physical memory, I/O and the dual cores.

These processors meet the needs of a wide range of performance-intensive, low-power embedded applications in smaller form factors such as interactive clients (i.e., point-of-sale terminals and ATMs), gaming platforms, industrial control and automation, digital security surveillance and medical imaging. While incorporating advanced processor technology, these processors remain software-compatible with previous IA-32 processors.

The Intel Core 2 Duo processor E6400<sup>A</sup> and the Intel Core 2 Duo processor E4300<sup>A</sup> are validated with the Intel® Q965 Express chipset, which includes an optimized memory engine for exceptional system performance, and new technologies for enhanced graphics, sound and manageability. Intel® Quiet System Technology within the chipset uses a Digital Thermal Sensor (DTS) to regulate system and processor fan speeds so that system fans spin only as fast as needed to cool the system.

## Intel® Core™ Microarchitecture

Intel Core microarchitecture provides enhanced energy-efficient performance to help equipment manufacturers optimally balance processing capabilities within power and space constraints.

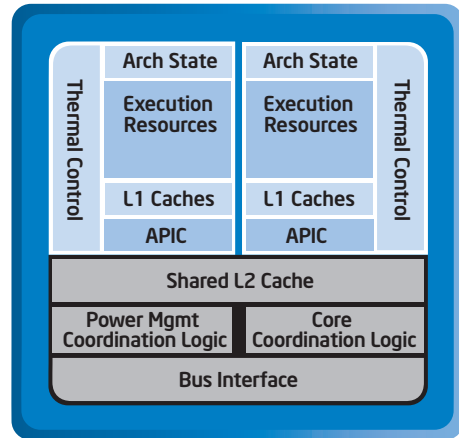
- **Intel® Wide Dynamic Execution:** Executes four instructions per clock cycle to improve execution speed and efficiency. Each core can complete up to four full instructions simultaneously using an efficient 14-stage pipeline.



- **Intel® Advanced Smart Cache:** Improves system performance by significantly reducing memory latency to frequently used data through dynamic allocation of shared L2 cache to each of the processor cores.
- **Intel® Smart Memory Access:** Optimizes use of available data bandwidth from the memory subsystem to accelerate out-of-order execution. A newly designed prediction mechanism reduces the time in-flight instructions must wait for data. New pre-fetch algorithms move data from system memory into fast L2 cache in advance of execution. These functions keep the pipeline full, improving instruction throughput and performance.
- **Intel® Advanced Digital Media Boost:** Accelerates execution of SSE/2/3 instructions to significantly improve multimedia performance. 128-bit SSE instructions are issued at a throughput rate of one per-clock cycle, effectively doubling the speed of execution on a per-clock basis over previous-generation processors.
- **Intel® Intelligent Power Capability:** Manages runtime power consumption of execution cores by turning on computing functions only when needed. Reduces overall power consumption, enabling quieter, more power-efficient system designs.

## Product Highlights

- **Intel® Virtualization Technology<sup>1</sup>:** Supported in the Intel Core 2 Duo processor E6400, this allows one hardware platform to function as multiple “virtual” platforms. It offers improved manageability, limiting downtime and maintaining worker productivity by isolating computing activities into separate partitions. It also provides greater isolation and security between different applications and operating systems for added protection against corruption.
- **Intel® 64 Architecture<sup>2</sup>:** Supports 64-bit instructions, providing flexibility for 64-bit and 32-bit applications and operating systems. Access to larger physical memory space reduces load on the system and allows faster access to data from RAM instead of the hard drive.
- **Execute Disable Bit<sup>3</sup>:** Allows memory to be marked as executable or non-executable when combined with a supporting operating system. If code attempts to run in non-executable memory, the processor raises an error to the operating system. This prevents some classes of viruses or worms that exploit buffer overrun vulnerabilities and helps improve system security.
- **Digital Thermal Sensor (DTS):** Measures maximum temperature on the die at any given time.
- Embedded lifecycle support protects system investment by enabling extended product availability for embedded customers.
- Along with a strong ecosystem of hardware and software vendors, including members of the Intel® Communications Alliance ([intel.com/go/ica](http://intel.com/go/ica)), Intel helps developers cost-effectively meet design challenges and shorten time-to-market.



Intel® Core™2 Duo processor, based on Intel® Core™ microarchitecture, includes two complete execution cores, shared L2 cache, and intelligent power management features which deliver significantly greater performance-per-watt over previous Intel® single-core processors.

## Intel® Core™2 Duo Processors for Embedded Computing

Product Number	Core Speed	Front-Side Bus Speed	L2 Cache	Thermal Design Power	VID	Tj Max	Package
<b>Intel® Core™2 Duo Processor E6400<sup>4</sup></b>							
HH80557PH0462M	2.13 GHz	1066 MHz	2 MB Unified	65 watts	0.85 V-1.3625 V	Tc Max = 5° C to 61.4° C	LGA775
<b>Intel® Core™2 Duo Processor E4300<sup>4</sup></b>							
HH80557PG0332M	1.80 GHz	800 MHz	2 MB Unified	65 watts	0.85 V-1.3625 V	Tc Max = 5° C to 61.4° C	LGA775

<sup>1</sup> Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

<sup>2</sup> 64-bit computing on Intel architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel® 64 architecture. Performance will vary depending on your hardware and software configurations. Consult with your system vendor for more information.

<sup>3</sup> 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.

<sup>4</sup> Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See [http://www.intel.com/products/processor\\_number](http://www.intel.com/products/processor_number) for details.

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