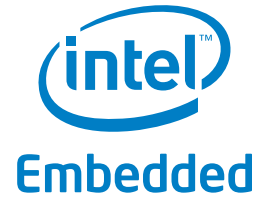
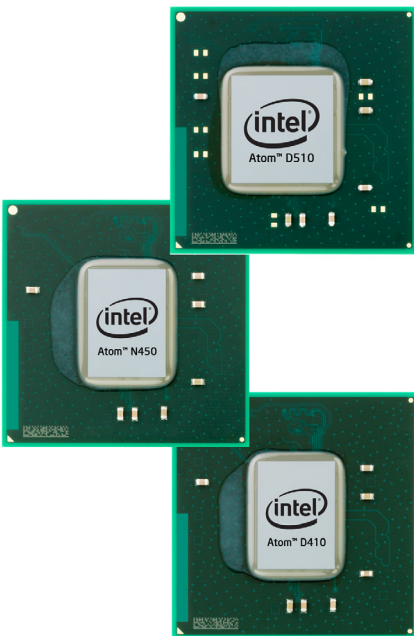


## PLATFORM BRIEF

Intel® Atom™ Processor Family  
with Intel® 82801HM I/O Controller  
Embedded Computing



# Intel® Atom™ Processors N450, D410 and D510 for Embedded Computing



## Overview

The latest Intel® Atom™ processor family includes integrated, enhanced graphics and memory controllers on 45nm process technology, delivering significant power reduction, performance improvements and smaller platform footprint over the previous Intel® Atom™ processor N270<sup>Δ</sup>. This family includes the dual-core Intel® Atom™ processor D510<sup>Δ</sup> and single-core Intel® Atom™ processors N450<sup>Δ</sup> and D410<sup>Δ</sup>.

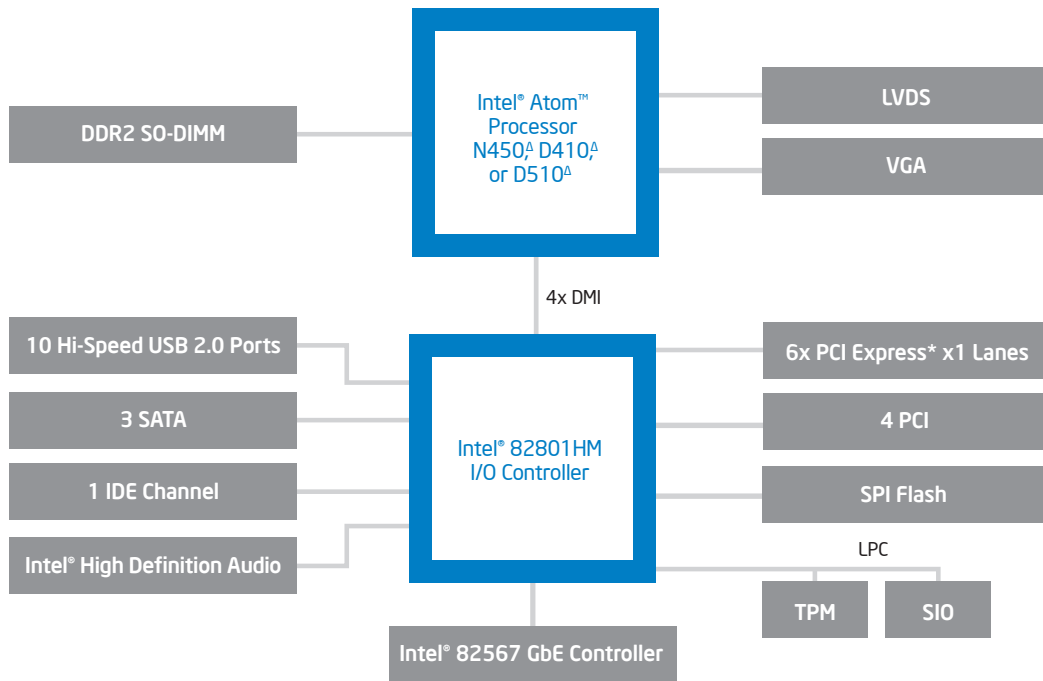
This platform includes the Intel® 82801HM I/O Controller, providing an Intel® High Definition Audio<sup>1</sup> interface, along with rich I/O capabilities and flexibility via high-bandwidth interfaces such as PCI Express,<sup>\*</sup> PCI, Serial ATA, and Hi-Speed USB 2.0 connectivity. Intel® Embedded Flexible Design saves time and money by allowing developers to design and/or manufacture a single board that can then be populated with any of the three processors, with minimal changes.

Featuring extended lifecycle support, these processors offer an excellent solution for embedded market segments such as print imaging, digital signage, retail and transaction solutions (point-of-sale, ATMs, kiosks, transaction terminals), thin clients, digital security, residential gateways, commercial and industrial control. The processors remain software compatible with previous 32-bit Intel® architecture and complementary silicon.

## Product Highlights

- Intel® Embedded Flexible Design enables scalability for the first time on the Intel Atom processor, with minor BOM stuffing options.
- Integrated graphics and memory controllers, built directly into the processor die, support lower power and smaller footprint for small form factor designs.
- Memory support for DDR2 667 MHz with up to 2 GB addressability for improved system responsiveness.
- Integrated Intel® Graphics Media Accelerator 3150 supports LVDS and VGA ports for multiple connectivity options.
- Dual cores deliver full parallel execution of multiple software threads, enabling higher levels of performance. (D510 only).
- Intel® Streaming SIMD Extensions (SSE) 2 and Intel® SSE3 enable software to accelerate data processing in specific areas, such as complex arithmetic and video decoding.
- Enhanced Intel® Deeper Sleep (C4/C4E) reduces power consumption by flushing cache data to system memory during periods of inactivity and forcibly reducing the performance state of the processor when entering a low-power state (N450 only).
- Intel's hafnium-based 45nm Hi-k metal gate silicon process technology reduces power consumption, increases switching speed, and significantly increases transistor density over previous 65nm technology.

- Intel® Hyper-Threading Technology<sup>2</sup> (two threads) provides high performance-per-watt efficiency in an in-order pipeline, and increased system responsiveness in multi-tasking environments. One execution core is seen as two logical processors, and parallel threads are executed on a single core with shared resources.
- Dynamic L2 cache sizing reduces leakage due to transistor sleep mode.
- Execute Disable Bit<sup>3</sup> prevents certain classes of malicious “buffer overflow” attacks.
- 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® Embedded Alliance ([intel.com/go/eca](http://intel.com/go/eca)), Intel helps to cost-effectively meet development challenges and speed time-to-market.



## Software Overview

The following independent operating system and BIOS vendors provide support for these platforms.

### OPERATING SYSTEM

Microsoft Windows\* XP SP3

Microsoft Windows Embedded Standard (XPe) SP3

Microsoft Windows Embedded Point of Sale (WEPOS)

Microsoft Windows Embedded CE 6.0 R2

Fedora Linux\*

MontaVista Linux

Wind River VxWorks\*

SUSE Linux Enterprise 10

### CONTACT

Intel provides drivers<sup>4</sup>

Intel provides drivers<sup>4</sup>

Intel provides drivers<sup>4</sup>

Adeneo, BSQUARE, WiPro

Fedora Community

MontaVista

Wind River

Novell

### BIOS

American Megatrends

Insyde Software

Phoenix Technologies

## Intel® Atom™ Processors for Embedded Computing

PROCESSOR <sup>4</sup>	PRODUCT NUMBER	CORES	CORE SPEED	L2 CACHE	GRAPHICS SPEED	C-STATES SUPPORTED	THERMAL DESIGN POWER <sup>5</sup>	TJUNCTION	PACKAGE
N450	AU80586GE025D	1	1.66 GHz	On-die 512 KB, 8-way	200 MHz	C0 – C4	5.5 W	0 to 100° C	559-ball lead-free FCBGA 22 mm x 22 mm
D410	AU80610004671AA	1	1.66 GHz	On-die 512 KB, 8-way	400 MHz	C0 – C1	10 W	0 to 100° C	559-ball lead-free FCBGA 22 mm x 22 mm
D510	AU80610004392AA	2	1.66 GHz	On-die 2x 512 KB, 8-way	400 MHz	C0 – C1	13 W	0 to 100° C	559-ball lead-free FCBGA 22 mm x 22 mm

## Intel® 82801HM I/O Controller for Embedded Computing

PRODUCT	PRODUCT CODE	THERMAL DESIGN POWER	PACKAGE	FEATURES
Intel® 82801HM I/O Controller	NH82801HBM	2.4 W	TBGA676	Six PCI Express*, PCI, Serial ATA, and Hi-Speed USB 2.0 connectivity; Intel® High Definition Audio <sup>1</sup> interface.

## Intel in Embedded and Communications: [intel.com/embedded](http://intel.com/embedded)

<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 [www.intel.com/products/processor\\_number](http://www.intel.com/products/processor_number) for details.

<sup>1</sup> Intel® High Definition Audio requires a system with an appropriate Intel® chipset and a motherboard with an appropriate codec and the necessary drivers installed. System sound quality will vary depending on actual implementation, controller, codec, drivers and speakers. For more information about Intel® HD audio, refer to <http://www.intel.com/>.

<sup>2</sup> Hyper-Threading Technology requires a computer system with a processor supporting Hyper-Threading Technology and an HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See [www.intel.com/info/hyperthreading/](http://www.intel.com/info/hyperthreading/) for more information including details on which processors support HT Technology.

<sup>3</sup> Enabling Execute Disable Bit functionality requires a platform or system 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> Drivers available at: [downloadcenter.intel.com](http://downloadcenter.intel.com) (enter chipset name).

<sup>5</sup> TDP specification should be used to design the processor thermal solution. TDP is not the maximum theoretical power the processor can generate.

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