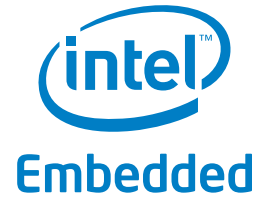


## PLATFORM BRIEF

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



# Intel® Atom™ Processors 400 and 500 Series 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>A</sup>. This family includes two dual-core processors (D525<sup>A</sup> and D510<sup>A</sup>) and four single-core processors (N455<sup>A</sup>, N450<sup>A</sup>, D425<sup>A</sup> and D410<sup>A</sup>). Some processors offer memory support up to DDR3 800 MHz.

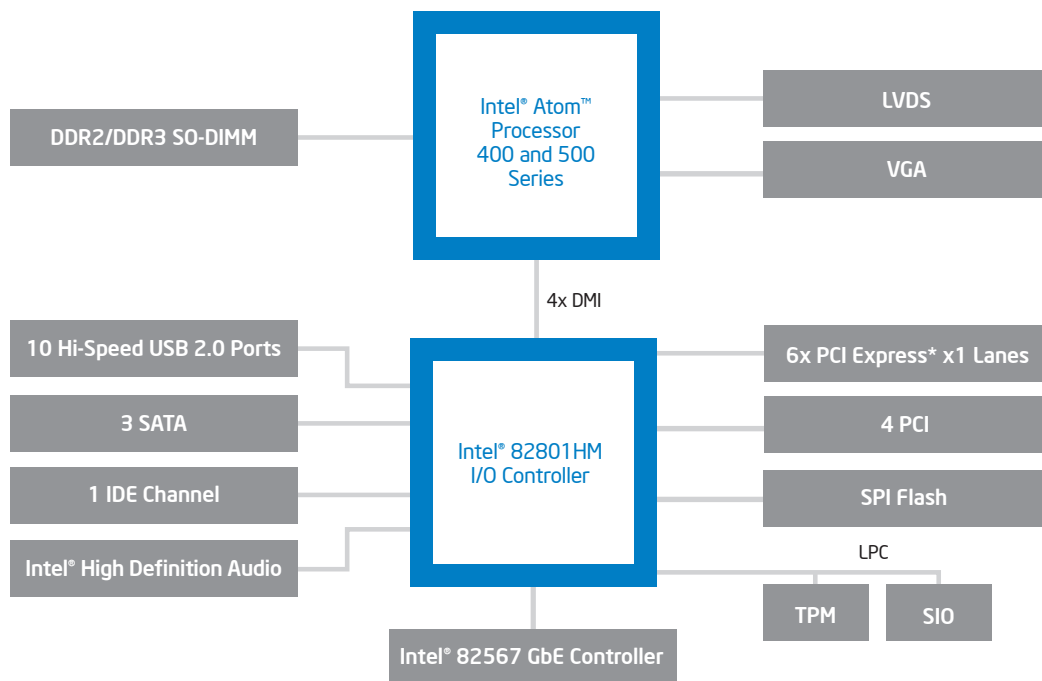
This platform includes the Intel® 82801HM I/O Controller, providing an Intel® High Definition Audio<sup>1</sup> interface, along with rich I/O capabilities and flexibility via high-bandwidth interfaces such as PCI Express,\* PCI, Serial ATA, and Hi-Speed USB 2.0 connectivity. Intel® Embedded Flexible 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 six 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 or DDR3 optimizes system cost and performance. DDR3 memory with up to 4 GB memory addressability provides improved system responsiveness.
- Integrated Intel® Graphics Media Accelerator 3150 supports LVDS and VGA ports for multiple connectivity options.
- Dual-core processors (D525 and D510) deliver full parallel execution of multiple software threads, enabling higher levels of performance.
- 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 (N455 and 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.
- Ideal for smaller footprint designs, 559-ball lead-free FCBGA package (22 mm x 22 mm) on all processors provides pin-to-pin compatibility.
- 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/embeddedalliance](http://intel.com/go/embeddedalliance)), 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	MEMORY	MEMORY CAPACITY	C-STATES SUPPORTED	THERMAL DESIGN POWER <sup>5</sup>	TJUNCTION
D525	AU80610006225AA	2	1.80 GHz	On-die 1 M, 8-way	DDR3-800, DDR2-667	4 GB	C0 - C1	13 W	0 to 100° C
D425	AU80610006252AA	1	1.80 GHz	On-die 512 KB, 8-way	DDR3-800, DDR2-667	4 GB	C0 - C1	10 W	0 to 100° C
N455	AU80610006237AA	1	1.66 GHz	On-die 512 KB, 8-way	DDR3-667, DDR2-667	2 GB	C0 - C4	6.5 W	0 to 100° C
D510	AU80610004392AA	2	1.66 GHz	On-die 1 M, 8-way	DDR2-667	2 GB	C0 - C1	13 W	0 to 100° C
D410	AU80610004671AA	1	1.66 GHz	On-die 512 KB, 8-way	DDR2-667	2 GB	C0 - C1	10 W	0 to 100° C
N450	AU80610004653AA	1	1.66 GHz	On-die 512 KB, 8-way	DDR2-667	2 GB	C0 - C4	5.5 W	0 to 100° C

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

<sup>1</sup> Requires an Intel® HD Audio enabled system. Consult your PC manufacturer for more information. Sound quality will depend on equipment and actual implementation. For more information about Intel® HD Audio, refer to <http://www.intel.com/design/chipsets/hdaudio.htm>

<sup>2</sup> Requires an Intel® HT Technology enabled system, check with your PC manufacturer. Performance will vary depending on the specific hardware and software used. Not available on Intel® Core™ i5-750. For more information including details on which processors support HT Technology, visit <http://www.intel.com/info/hyperthreading>

<sup>3</sup> Requires an Execute Disable Bit enabled system. Check with your PC manufacturer to determine whether your system delivers this functionality. For more information, visit <http://www.intel.com/technology/xdbit/index.htm>

<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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