



Axiomtek Intel® Braswell Board Products

White Paper

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Braswell - Intel's next generation of system-on-a-chip (SoC) following the Bay Trail –M/D product line

Intel® has launched the first Braswell system-on-a-chip (SoC) for entry-level desktops and notebooks. Based on 14nm technology, Intel® Braswell SoCs are powered by new CPU and GPU architectures, and come with higher general processing and graphics performance at the same or lower thermal design power (TDP) than the previous generation of entry-level SoCs. Intel® currently offers mobile Celeron® N3000, N3050, N3150, and Pentium® N3700. Intel® Celeron® N3050, N3150 and Pentium® N3700 will be also available in desktop PCs.

The Intel® Braswell processors integrate one or two CPU modules, a graphics unit, a DDR3 memory controller, chipset logic and I/O interfaces. Each CPU module is comprised of two "Airmont" CPU cores, backed up by 1MB shared L2 cache. The cores have enabled SIMD instructions up to SSE4, and support Intel 64, virtualization and Burst Performance technologies. The GPU is built on Generation 8 LP architecture, and it incorporates up to 16 execution units. The memory controller supports DDR3-1600 memory on all SKUs.

The Intel® Celeron® N3000 and N3050 are dual-core SoCs with a 1MB L2 cache. The Intel® N3000 runs at 1.04 GHz, has 2.08 GHz maximum burst frequency and 4 Watt TDP. The Intel® N3050 is clocked higher, at 1.6 GHz base and up to 2.08 GHz, and has 50% higher TDP. Both chips have the GPU clocked at 320 MHz, with the maximum boost frequency of 600 MHz.

Intel® Celeron® N3150 and Pentium® N3700 have 4 CPU cores, 2MB of L2 cache, and they run at 1.6 GHz. The maximum CPU frequencies of these models are 2.08 GHz and 2.4 GHz respectively, and the maximum GPU frequencies are 640 MHz and 700 MHz.

Benefits

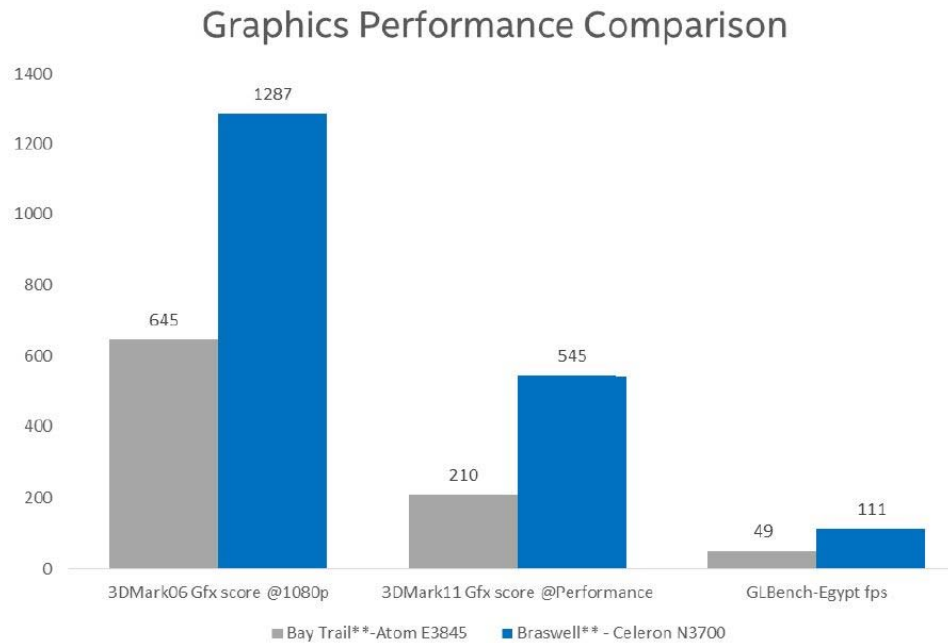
Intel's 14nm process technology brings value and efficiency to everyday computing with essential features that balance cost, performance, and power.

Evolving the entry-level PC platform

Based on Intel's 14nm manufacturing process, Braswell brings Intel's latest manufacturing innovations and processor efficiencies to everyday computing systems. These new SoCs deliver the performance needed to power everyday computing experiences along with the latest capabilities such as touch, voice, and Intel® Wireless Display.

Improvements include:

- Up to two times better graphics performance compared to previous generations through enhancements to the graphics architecture, additional execution units, enhanced codec decode support, and support for the latest graphics APIs. The chart below shows the comparison of graphics performance for Braswell vs. Bay Trail.

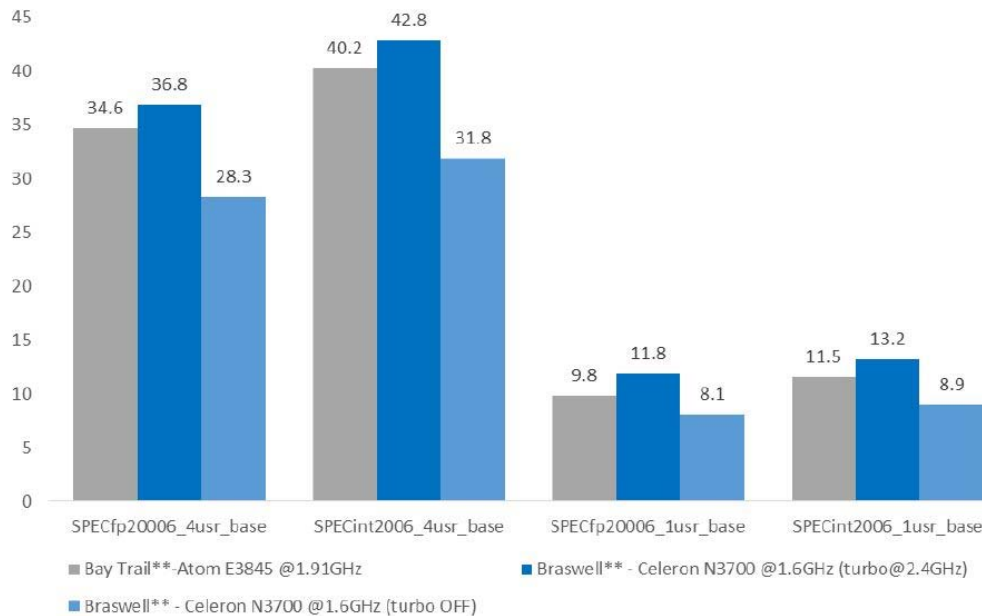


- Opportunities to reduce BOM costs with lower thermal design points through power efficiencies that improve graphics performance and battery life.

Better performance

The power efficiency of the new 14nm process technology combines with improvements in its processor instructions to deliver faster performance in the latest Intel® Celeron® and Pentium® processors. These processors support up to four cores with Intel® Burst Technology2, which dynamically controls the performance and power of both the cores and graphics—boosting performance exactly where and when it is needed and saving energy when it counts. The following chart shows the comparison of CPU performance for Intel® Braswell versus previous generation platforms.

CPU Performance Comparison



Stunning Visuals

Intel® HD Graphics deliver an eye popping visual experience and take Intel® built-in visuals to the next level. With the latest Intel® Celeron® and Pentium® processors, you can watch, game, and create seamlessly:

- Videos come to life in 4K 30Hz, so users can enjoy vibrant multimedia experiences on 4K displays. The latest Intel® Celeron® and Pentium® processors include enhanced new codec decode support for VP8, VP9, H.264, and HEVC.
- Broad cross platform casual games will run seamlessly with support for (DX11.2, DX12 ready).
- Intel® Quick Sync Video technology accelerates most video capabilities allowing users to create and share in real time and multitask without interruption.
- The latest Intel® Celeron® and Pentium® processors also enable HD video conferencing with great video chat experience on popular applications.

Longer Battery life

Processor power design improvements across the CPU, graphics, I/Os, and power management, plus the increased power efficiency of Intel's 14nm manufacturing process, combine to offer users up to 9% additional active battery life compared to the previous generation.

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MANO300

[MANO300](#), a new low-power, high performance Mini-ITX motherboard built with the latest Intel® Celeron® processor N3150 SoC (codename: Braswell) with integrated Intel® Gen 8 graphics which supports up to 4K resolution. Two SO-DIMM sockets are provided to support up to 8GB of DDR3L-1333 memory. The 12V single

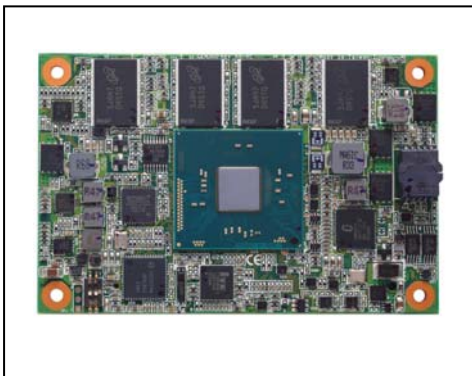


voltage DC power jack or ATX power makes the power input selection more flexible for different automation and embedded industries. Its friendly fanless cooling system design and compact form factor is aimed at space-constricting applications as well as harsh environments.

With one PCIe x1 and one PCI Express Mini Card interface, the small form factor MANO300 can fulfill different application needs. One SATA-600 and one mSATA interface are available for extensive storage needs. Rich I/O options include two USB 2.0 ports, four USB 3.0 ports, two RS-232/422/485 ports, four RS-232, two Gigabit LAN ports, VGA, HDMI, LVDS, one SDXC slot, one PS/2 KB/MS, and 8-CH digital I/O. Furthermore, the MANO300 runs well with Windows® 7 and 8 operating systems.

CEM300

[CEM300](#), the company's new COM Express® Type 10 module is based on the latest generation Intel® Pentium® and Celeron® quad-core/dual-core processors (codename: Braswell) N3700/N3150/N3050 SoC with support for up to 8 GB DDR3L memory onboard. Integrated with Intel® Gen 8 graphics, the COM Express® Type 10



computer-on-module provides excellent graphics performance including support for DirectX11.1, OpenGL 4.2 and ensures high-quality user experience with the latest 3D features and resolution up to 4K (3840 x 2160 @ 30 Hz). The ultra-small mini module comes with 4~6 watts low power consumption, and provides wide range voltage power input 4.75V to 20V for harsh industrial environments. The Intel® Braswell-based CEM300 is ideal for telecommunication, medical imaging, digital signage, gaming machines, military, and IoT related applications.

The COM Express® pin-out type 10 definition in the mini form factor (84 x 55mm) is well-suited to match the feature and performance requirements of the segments of the embedded market delivering ultra-small as well as flexible customization solutions.

Graphics outputs include one LVDS (18/ 24-bit single channel) and one DDI port supporting HDMI/DVI/DisplayPort. Optionally an embedded DisplayPort (eDP) is also available. An increased amount of high-bandwidth I/O interfaces include four PCI Express lanes, two SATA-600, one Gigabit LAN, two USB 3.0 ports, eight USB 2.0 ports, and four digital I/O channels. The LPC bus is available for easy connection to legacy I/O interfaces. For evaluation and development purposes, Axiomtek also provides the [CEB94008](#), a COM Express® mini carrier board, to operate with the CEM300 in order to support rich I/O and expansions interfaces. To ensure reliability and stability, hardware monitoring and Watchdog Timer are supported. This powerful Intel® Braswell SoC quad-core COM Express Type 10 mini embedded board can operate with Windows® 7/8.1/10 and Linux operating systems.

Technical Support by Axiomtek

The Axiomtek design guide for COM Express® carrier boards serves as a general guide for carrier board designs. The design guide focuses on maximum flexibility to accommodate a range of COM Express® Modules. The Axiomtek COM Express® design guide explores the requirements of the COM Express® specification and provides recommendations on how to design COM Express® Baseboards to support features of Axiomtek COM Express® Modules.

The carrier board design guide provides schematic examples and information on standard I/O interfaces, connections, and routing. The guide also offers ideas to maximize the design potential of COM Express® carrier boards to accommodate all Axiomtek COM Express® Modules.

The COM Express® Module user guides documents provide specifications and features for an individual COM Express® Module. You can find all user manuals, design guides, mechanical drawings and other technical documents for COM Express® Modules on the Axiomtek Technical Portal (ATP) Website.

Axiomtek's ATP website: <http://atp.axiomtek.com.tw/atp/>.

Axiomtek's global website: www.axiomtek.com.

About Axiomtek Co., Ltd.

Axiomtek Co. Ltd. is one of the world's leading designers/manufacturers of PC-based industrial computer

products. From our roots as a turnkey systems integrator specializing in data acquisition and control systems, Axiomtek has mirrored the PC evolution in various industries by shifting our focus toward the design and manufacture of PC-based industrial automation solutions.

Axiomtek Co., Ltd. established in 1990, has more than 60 distributor partners globally. Axiomtek offers Industrial PCs (IPC), Single Board Computers and System on Modules (slot CPU card, small form factor embedded boards & SoM), Fanless & Rugged Embedded System (eBOX and rBOX), Intelligent Transportation Embedded System (tBOX), Industrial IoT Gateway & Industrial Firewall, Touch Panel Computers (TPC), Medical PCs (MPC), Human-Machine Interface (HMI), Digital Signage and Players (DS), Industrial Network and Network Communication Appliances (NA).

As an associate member of the Intel® Internet of Things Solutions Alliance, Axiomtek continuously develops and delivers cutting edge solutions based on the latest Intel® platforms.

To learn more about how our Design-in Services or motherboards can support your application needs, visit us at www.axiomtek.com, or email us at info@axiomtek.com.tw.