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Scaling New Architecture

An Introduction to AAEON's Solutions Based on the Intel Processor N-series, Intel Atom Processor X Series, & Intel Core i3 Processor N-series Platforms

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Overview

The 12th Generation Intel® Core™ processor platform marked a significant leap forward with the introduction of the innovative performance hybrid architecture. This groundbreaking design combines two distinct core types on a single chip: Performance-cores (P-cores) and Efficient-cores (E-cores). The advantage of this architecture is the ability to optimize both performance and power efficiency. P-cores are dedicated to handling resource-intensive tasks, while E-cores efficiently manage lighter workloads. However, not every application demands the high processing power provided by P-cores. In response, cost-effective entry-level platforms based on the Gracemont CPU microarchitecture were developed, offering a unique combination of performance, affordability, and low power consumption.

This new generation, formerly known as Alder Lake-N, features a range of processors, including the Intel® Processor N-series, Intel Atom® Processor X Series, and most notably the Intel® Core™ i3 Processor N-series. The primary theme across this collection is power efficiency, with CPUs spanning from 6W to 15W in thermal design power (TDP), corresponding to various processing capacities. These processors cater to a broad spectrum of applications, from the 2-core Intel Atom® x7211E to the robust 8-core Intel® Core™ i3-N305, offering a versatile processor line suitable for powering solutions across different markets.



Low Power, High Performance

The processor platform, built entirely on Gracemont core architecture, prioritize power-saving without sacrificing performance. With clock speeds reaching up to 3.80 GHz and 6MB of Intel® Smart Cache, the range is designed to handle a wide range of tasks efficiently. Whether it's the 8-core Intel® Core™ i3-N305 processor or the dual-core Atom® x7211E, the entire series excels in power-efficiency, making them ideal for embedded solutions where low power consumption and reliable performance are paramount.



MIPI Camera Compatibility

The processor series' MIPI camera support is a game-changer for applications requiring high-quality imaging. MIPI technology allows for seamless integration of superior image quality and efficient visual data acquisition. This facet makes the generation particularly useful for applications such as advanced machine vision, industrial automation, and AMR. The high-speed MIPI interface ensures precise and rapid data exchange between the processor and cameras, enhancing image processing and analytics.



Flexible Scalability

Providing embedded computing solutions for deployment across a range of vertical markets, AAEON takes steps to ensure that its products are equipped with the most suitable technologies for its customer's needs. The wide range of processor options across the Intel® Processor N-series, Intel Atom® Processor X Series, and Intel® Core™ i3 Processor N-series platforms give AAEON customers the freedom to choose between low-power, cost-effective solutions and CPUs with more robust processing capabilities, simplifying the process of building embedded solutions.

BOXER-6406-ADN

Available in SKUs powered by the Intel® Processor N200, Intel® Processor N50, and Intel Atom® x7211E processors, the BOXER-6406-ADN is an exceptionally compact and rugged fanless embedded box PC, measuring just 186mm x 104.6mm x 49.1mm. It offers a wide temperature range of -20°C to 60°C, a voltage input range of 9V to 36V with over/under-voltage and short-circuit protection, high shock and vibration tolerance, and lockable I/O connectors. These features make it highly suitable for deployment in harsh industrial environments.

Dual 2.5GbE RJ-45 and dual USB 3.2 Gen 2 Type-A ports provide excellent connectivity for peripheral devices, while DB-9 and DB-15 ports offer access to RS-232/422/485 and digital I/O functions. As a result, the BOXER-6406-ADN is tailor-made for automated guided vehicle (AGV), edge gateway, and factory automation applications. Furthermore, its expansion slots, such as its M.2 2230 E-Key and M.2 2280 M-Key, enable wireless connectivity and additional storage options, transforming the BOXER-6406-ADN into an edge gateway that enhances data exchange and supports automation protocols.



BOXER-6617-ADN

Harnessing the capabilities of the Intel® Core™ i3-N305, Intel Atom® x7211E, Intel® Processor N50, or Intel® Processor N97, the new BOXER-6617-ADN is equipped with a comprehensive array of interfaces for high-speed data exchange with external devices. These interfaces include six DB-9 ports supporting RS-232/422/485, dual 2.5GbE LAN, dual HDMI ports, and a 10-pin terminal block. These features provide the essential communication protocols required for precise Autonomous Mobile Robot (AMR) functionality, while the system's flexible storage options offer the resources for Automated Guided Vehicle (AGV) route mapping.

Operating within a temperature range of -20°C to 70°C, a wide 9V to 36V DC input range with circuit protection, and high resistance to vibration and shock, the BOXER-6617-ADN is the ideal choice for challenging environments such as factories. The device facilitates unrestricted development through SSD-based storage, including a 2.5" SATA HDD and an M.2 M-Key slot. Additionally, M.2 E and B-Key slots support 5G, Wi-Fi, and LTE connectivity, enabling seamless edge-to-cloud data exchange and wireless communication with industrial machinery.



BOXER-6711-ADN

The upcoming BOXER-6711-ADN, a DIN Rail Mount Embedded Box PC designed for embedded automation control applications, makes use of the Intel Atom® x7211E, Intel® Processor N200, and Intel® Processor N50 CPUs. Despite its slim dimensions of just 48mm x 190mm x 124mm, the BOXER-6711-ADN offers a rich set of I/O options, including dual 2.5GbE LAN, dual USB 3.2 Gen 2 Type-A ports, and dual HDMI display ports.

Complementing these features are three DB-9 ports and one DB-15 port, providing users with RS-232/422/485 and 8-bit Digital IO functionality. These interfaces cover all the necessary communication protocols required for industrial automation. Onboard TPM 2.0 adds an extra layer of data security to the system, which is further enhanced by the availability of up to 32GB of high-bandwidth, SODIMM-based DDR5 system memory, facilitating expedited data processing.

The BOXER-6711-ADN is also mechanically rugged, capable of functioning in a wide temperature range from -20°C to 60°C. Furthermore, it boasts impressive expandability options, including a full-size Mini Card, SIM Card slot, and M.2 M and E-Key slots. These features make it an excellent choice for demanding embedded automation control applications.



MIX-ALND1

The MIX-ALND1 Mini-ITX board is a highly efficient and versatile market solution. Setting it apart from many of AAEON's industrial motherboards, the MIX-ALND1 comes in SKUs featuring onboard CPUs, specifically the Intel® Processor N97 and Intel® Processor N50, both of which include integrated Intel® UHD Graphics.

Giving users multiple display configuration options, the board supports simultaneous 4K display resolution at 60Hz via physical HDMI 2.0 and DP 1.4 ports. Additionally, it offers colayed internal eDP and LVDS connectors, making the MIX-ALND1 particularly well-suited for enhancing point of sale and gaming applications.

The inclusion of digital I/O and serial port headers supporting two RS-232/422/485 and four RS-232 interfaces further facilitates the integration of various types of sensors. Moreover, the board's M.2 B, E, and M-Key slots provide support for 5G, Wi-Fi, and NVMe, giving the MIX-ALND1 all the necessary tools to reliably run sophisticated CNC (Computer Numerical Control) controller applications.

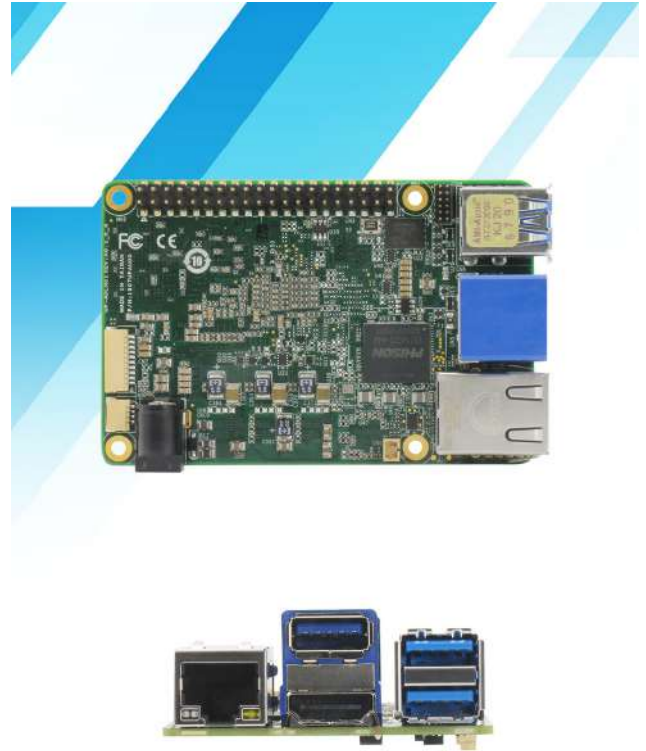


UP 7000

The UP 7000 stands as the world's smallest developer board featuring the Intel® Processor N-series platform. It boasts LPDDR5 system memory, Intel® UHD Graphics, onboard TPM 2.0, and compatibility with both Windows and Linux operating systems.

With 8GB of onboard LPDDR5 system memory, the UP 7000 offers exceptional data transmission speed for peripheral devices. It is equipped with three USB 3.2 Gen 2 ports, GbE LAN, and a Raspberry Pi-compatible 40-pin HAT, making it well-suited for applications that typically demand boards with denser onboard interfaces, such as Autonomous Mobile Robots (AMR).

Despite maintaining its compact 85mm x 56mm form factor, the UP 7000 supports up to Intel® Processor N200 performance in a fanless design. This design choice ensures reliability for a wider range of deployment environments. Moreover, the board's low power consumption to performance ratio contributes to its energy efficiency, all without compromising on quality.



UP 7000 Edge

The UP 7000 Edge is a Mini PC that accommodates the complete range of embedded Intel® Processor N-series CPUs, all within an exceptionally compact 3.62" x 2.52" x 1.78" (92mm x 64mm x 45.2mm) form factor.

This Mini PC features integrated Intel® UHD Graphics designed for 12th Gen Intel® Processors, ensuring reliable visual performance and optimally utilizing its HDMI 1.4b display output. Among its notable I/O features are three USB 3.2 Gen 2 ports and one RJ-45 port supporting Realtek RTL8111H-CG Gigabit Ethernet, thoughtfully grouped to provide connectivity for various peripheral devices.

With the inclusion of up to 8GB LPDDR5 memory and up to 64GB eMMC storage, the UP 7000 Edge offers both speed and storage capacity, catering to multitasking and data storage requirements. Additionally, the onboard TPM 2.0 enhances data security for added peace of mind.



UP Squared Pro 7000

The UP Squared Pro 7000 represents the third generation of AAEON's UP Squared Pro series, offering even greater development potential. It introduces several enhancements over its predecessor, including support for the Intel® Core™ i3-N305, the most advanced CPU from the Intel® Processor N-series, Intel Atom® Processor X Series, and Intel® Core™ i3 Processor N-series collection. Moreover, it boasts a wide temperature tolerance of -20°C to 70°C and a more dynamic set of interfaces, delivering improvements across the board compared to its predecessors.

The board is equipped with HDMI 2.0b, DP 1.2 ports, and DP 1.4a via USB Type-C, enabling the UP Squared Pro 7000 to run three simultaneous 4K displays. This capability makes it ideal for vision-intensive applications like digital signage. Additionally, the board supports MIPI camera connectivity via a 61-pin FPC connector, and it features two 2.5GbE and three USB 3.2 Gen 2 ports for connecting other peripheral devices such as IP cameras and sensors.



UP Squared Pro 7000 Edge

The UP Squared Pro 7000 Edge is the world's first fanless Mini PC powered by the Intel® Core™ i3 Processor N-series. It incorporates the most advanced CPUs from the Intel® Processor N-series, Intel Atom® Processor X Series, and Intel® Core™ i3 Processor N-series platforms.

This VESA-mountable Mini PC is compact, measuring just 4" x 4" (134mm x 105mm x 65mm), featuring a streamlined chassis design that allows users to access its M.2 E, B, and M-Key slots via a removable section of its heatsink. This feature offers greater ease with which to conveniently install 5G, Wi-Fi 6, and AI modules. Furthermore, the system's rear I/O panel houses a 40-Pin GPIO.

Onboard TPM 2.0 enhances data security, safeguarding information in transit, including data obtained via its two 2.5GbE and three USB 3.2 Gen 2 ports. These features collectively make the UP Squared Pro 7000 Edge a versatile industrial solution.

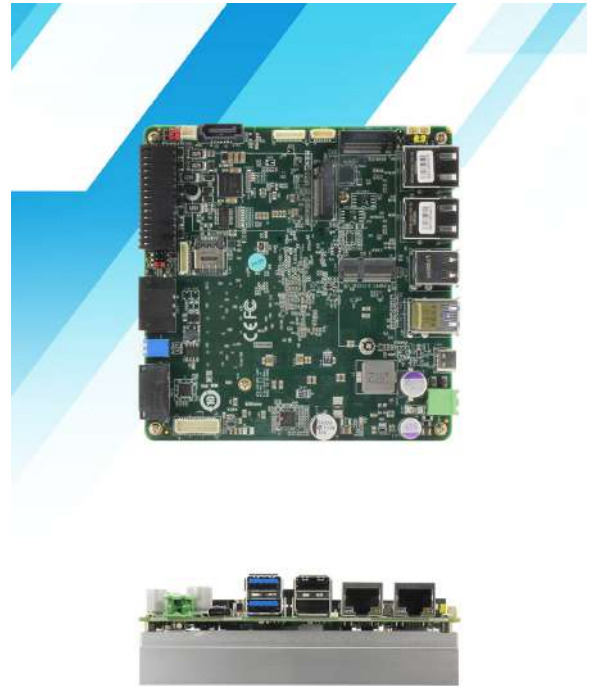


UP Xtreme 7100

The UP Xtreme 7100 is an advanced development platform that integrates an onboard Intel® Core™ i3-N305 CPU into the UP brand's most expansive form factor. This configuration offers developers a wide range of onboard and expandable features to create sophisticated Autonomous Mobile Robotics (AMR) solutions.

For connectivity, the UP Xtreme 7100 features three USB 3.2 Gen 2 ports and two RJ-45 ports for Intel® I226-IT Ethernet, running at 2.5GbE. These interfaces are ideal for integrating cameras and sensors. The board also supports RS-232/422/485 via a terminal block, and additional I/O functionality is accessible through a 30-pin Board-to-Board connector.

The board's expandability is a key feature for AMR applications, offering a trio of M.2 slots (E and B-Keys) and terminal blocks that support 2-channel CAN, digital I/O, and a 6-pin GPIO. The UP Xtreme 7100 is equipped with 16GB of high-bandwidth, onboard LPDDR5 system memory to ensure smooth and fast operation of these interfaces. Moreover, it provides ample storage for developing AI models with 64GB of eMMC, which can be augmented with a 6Gb/s SATA SSD and memory module via the board's M.2 2280 M-Key.



UP Xtreme 7100 Edge

The UP Xtreme 7100 Edge is a powerful and versatile Mini PC designed for a wide range of industrial robotics applications. It offers flexible CPU options with a choice of the Intel® Core™ i3-N305 or Intel® Processor N97 CPU, coupled with up to 16GB of LPDDR5 memory and integrated Intel® UHD Graphics for 12th Gen Intel® Processors. Storage options include up to 64GB eMMC alongside dual-lane PCIe Gen 3 via its M.2 2280 M-Key slot.

This compact system is well-equipped for the connectivity demands of service robotics, with a COM port for RS-232/422/485, along with CANBus, Digital I/O, and GPIO functions via terminal block. The system's I/O also features two RJ-45 ports for Intel® I226-IT ethernet running at 2.5GbE, alongside two USB Type-A ports and one USB Type-C port for USB 3.2 Gen 2 speed. These inputs, along with LPDDR5 system memory give the UP Xtreme 7100 Edge multiple options for camera and sensor installation.

The UP Xtreme 7100 Edge also houses a variety of expansion options, including M.2 B, E, and M-Key slots, which provide wireless communication, along with ample storage to assist with the development of inferencing models. It is also equipped with TPM 2.0 for enhanced security, a feature necessary for industrial robotics and automation applications.

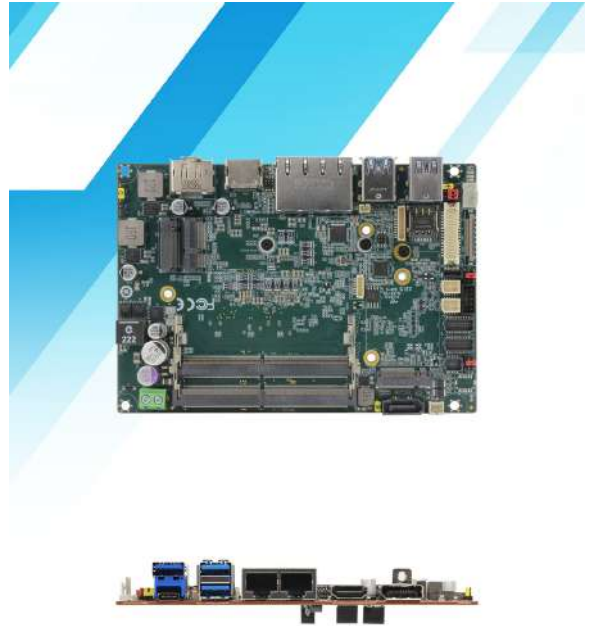


GENE-ADN6

The GENE-ADN6 is a densely populated 3.5" SubCompact Board that harnesses the capabilities of Intel® Processor N-series, Intel Atom® Processor X Series, and Intel® Core™ i3 Processor N-series CPUs, offering a wide range of features designed to cater to diverse applications.

Notably, the board boasts four COM connectors, 8-bit GPIO support, and an SMBus interface. These, in combination with high-bandwidth DDR5 system memory, enable expedited reactive decision-making, making it particularly well-suited for Autonomous Mobile Robot (AMR) applications. Additionally, with three 2.5GbE LAN ports and a display interface comprising LVDS, HDMI 1.4, and VGA connectors, the GENE-ADN6 represents a strong candidate for machine vision applications.

Despite its small size, high processing power, and support for numerous expansion modules, the board is capable of operating in harsh environments with temperatures ranging from -40°C to 85°C. This ruggedness makes it suitable for deployment in challenging conditions while maintaining functional integrity.



PICO-ADN4

The upcoming PICO-ADN4 is an advanced yet efficient single-board computer based on the compact 100mm x 72mm Pico-ITX form factor. It is a versatile solution capable of functioning in a wide -40°C ~ 85°C temperature range, making it suitable for a diverse range of rugged market deployments.

Despite its small size, the PICO-ADN4 offers a full range of I/O options, such as support for up to three simultaneous displays through a combination of LVDS, eDP, HDMI, and DDI interfaces. The board's external I/O includes two RJ-45 ports for Intel® I226 and Realtek RTL8111H-CG ethernet, operating at speeds of 2.5GbE and 1GbE, respectively. Additionally, it features two USB 3.2 Gen 2 ports and an internal I/O featuring RS-232/422/485 support via two COM pin headers.

With a wide temperature range from -40°C to 85°C and thermal dissipation options via a fanless heatsink or heatspreader, the PICO-ADN4 is versatile and can accommodate various expansion slots. These options include a full-size mSATA and an M.2 2230 E-Key, along with a 4-bit GPIO for additional functionality.



EPIC-ADN9

The EPIC-ADN9 is a 4" EPIC Board purpose-built for smart manufacturing and industrial automation projects, with SKUs powered by Intel Atom® x7425E, Intel® Core™ i3-N305, or Intel® Processor N97/N50 CPUs available, depending on the ratio of performance to efficiency required.

Featuring up to four physical LAN ports that support Intel® I226-V running at 2.5GbE, along with six COM and six USB ports, the board provides all the necessary communication protocols essential for smart factory deployments. Its wide voltage input range of 9V to 24V and fanless design make the EPIC-ADN9 well-suited to handle the environmental challenges often encountered in industrial settings.

The board offers a diverse selection of display outputs, including HDMI 1.4, eDP 1.4, DP 1.2, VGA, and LVDS, which allow it to support up to three simultaneous displays. This versatility makes the EPIC-ADN9 suitable for integration with both modern and legacy infrastructure in industrial automation applications.

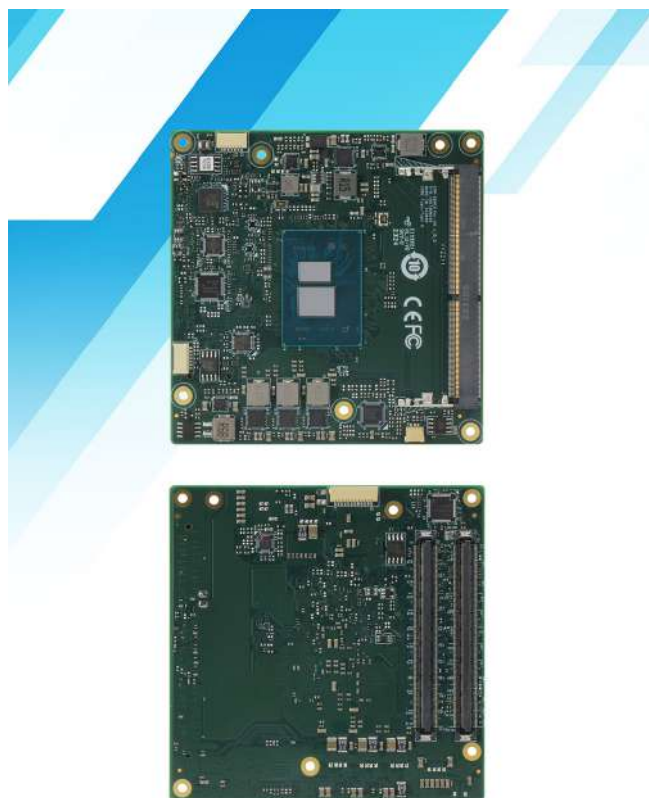


COM-ADNC6

The COM-ADNC6 is a COM Express Type 6 module that offers a choice of onboard CPUs, including the Intel® Core™ i3-N305, Intel Atom® x7425E, and Intel® Processor N97. This module is characterized by its flexibility, expandability, and extensive I/O specifications.

Equipped with a four-lane PCIe slot and support for two 6Gb/s SATA SSDs, the COM-ADNC6 provides ample storage and the ability to integrate add-on cards for a variety of application-specific purposes. This feature gives users multiple options for applications that require the higher processing capacity of the Intel® Core™ i3-N305 CPU and the storage to fully take advantage of the platform's offerings.

With DDR5 system memory via a SODIMM socket and interfaces including ten USB ports, 2.5GbE LAN, and audio, the COM-ADNC6 is an extremely versatile board capable of high-speed communication with external devices and equipment. The board also includes two display ports and connectors for either LVDS or eDP. This configuration is particularly valuable for applications that involve the acquisition and output of large volumes of data, such as clinical imaging.





Conclusion

To uphold AAEON's dedication to pioneering advancements in the embedded computing sphere, it is imperative to harness the latest and most cutting-edge technological architectures. Through the incorporation of the latest Intel® processor generations, AAEON is steadfast in its pursuit of delivering industry-leading embedded solutions designed to cater to a wide array of applications across various vertical markets.

About AAEON

Established in 1992, AAEON is one of the leading designers and manufacturers of industrial IoT and AI Edge solutions. With continual innovation as a core value, AAEON provides reliable, high-quality computing platforms including industrial motherboards and systems, rugged tablets, embedded AI Edge systems, uCPE network appliances, and LoRaWAN/WWAN solutions. AAEON provides industry-leading experience and knowledge to provide OEM/ODM services worldwide. AAEON also works closely with cities and governments to develop and deploy Smart City ecosystems, offering individual platforms and end-to-end solutions. AAEON works closely with premier chip designers to deliver stable, reliable platforms. For an introduction to AAEON's expansive line of products and services, visit www.aaeon.com.