

intel.
partner Titanium
IoT
Solutions

Pushing the Boundaries of Performance

AAEON Solutions Featuring the 13th Generation
Intel® Core™ Processor Family

AAEON[®]
an ASUS[®] assoc. co.

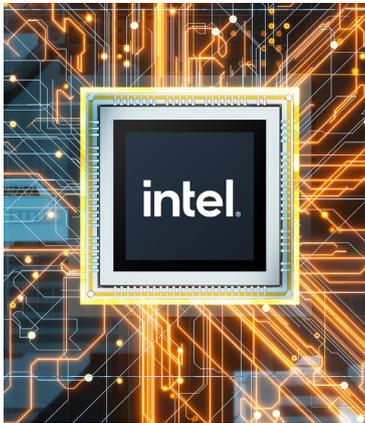
Table of Contents

Overview	3
Scaled Power-Efficiency	3
Enhanced Single & Multi-threaded Performance	3
Turbo Boosted Clock Speed	3
GENE-RAP6	4
GENESYSM-RAP6	4
UP Xtreme i12	5
UP Xtreme i12 Edge	5
UP Squared i12	6
UP Squared i12 Edge	6
HPC-RPSC	7
MAX-Q670A	8
Conclusion	9
About AAEON	9

Overview

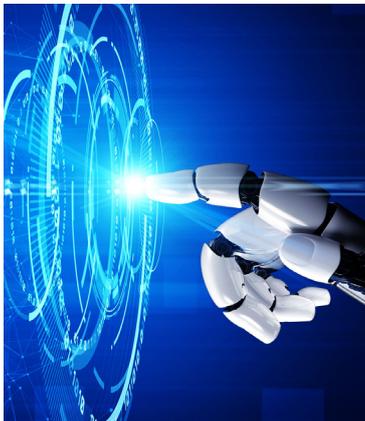
Building on the innovative performance hybrid architecture introduced by its predecessor, the 13th Generation Intel® Core™ Processor Family has firmly established the importance of mixed-core die architecture and flexible core frequency in the development of complex embedded solutions. The platform's greater number of performance cores with substantially elevated single-core frequency plays a role in elevating the sheer computing power of the generation's processor lineup. This is particularly useful when these processors are deployed in applications that require optimized AI workloads.

Intel® Thread Director facilitates the balance between high-performance computing and efficient task management. It does so by monitoring the runtime of each thread and providing runtime feedback to dynamically ensure workload allocation is executed in the most optimal and efficient manner. Overall, the 13th Generation Intel® Core™ Processor Family empowers embedded computing systems with enhanced performance, versatility, and efficiency, contributing to improved functionality, AI workload management, and responsiveness in a variety of embedded applications.



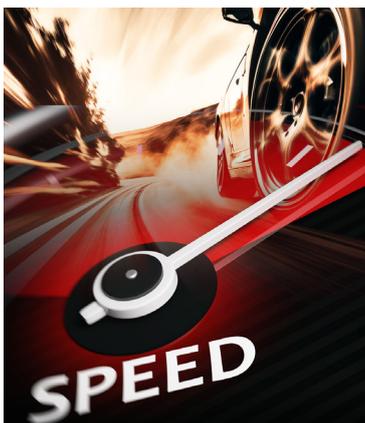
Scaled Power-Efficiency

The 13th Gen Intel Core Processor Family brings forth significant advantages for embedded computing applications. Its performance hybrid architecture, comprising up to eight Performance-cores (P-cores) and up to 16 Efficient-cores (E-cores), efficiently managed by Intel® Thread Director, offers unparalleled processing power for embedded systems¹. Moreover, memory bandwidth improvements mean the platform can support DDR5 at 5600 MT/s for extremely low latency.



Enhanced Single & Multi-threaded Performance

The enhanced performance core cache architecture in the 13th Gen Intel Core Processor Family delivers up to a 15% increase in single-threaded performance and a remarkable 41% improvement in multi-threaded performance compared to the 12th Generation platform². This translates to more efficient AI inference at the edge, reduced latency for automation applications, and enhanced multitasking capabilities.



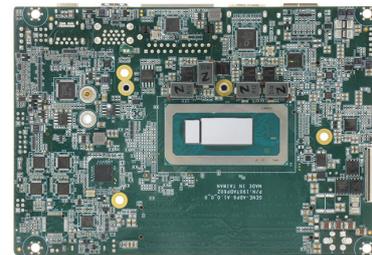
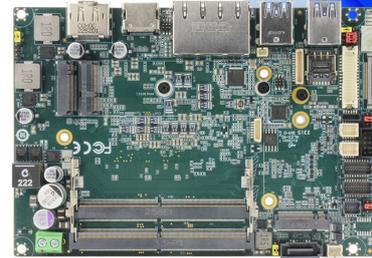
Turbo Boosted Clock Speed

The Max Turbo Frequency feature empowers the processor to temporarily boost its clock speed beyond the base frequency to meet exceptional workload demands. This increase in clock speed enhances performance, allowing the CPU to handle demanding tasks more efficiently. With a maximum single-core frequency of up to 6.00 GHz, 13th Generation Intel® Core™ Processors excel at meeting time-sensitive application demands, enabling split-second decision-making³.

GENE-RAP6

The GENE-RAP6 is a 3.5" SubCompact Board available in SKUs featuring 13th Generation Intel® Core™ processors, including options such as the Intel® Core™ i7-1370PE. It boasts the capability to accommodate up to 64GB of SODIMM-based DDR5 memory, ensuring lightning-fast data processing for a full range of I/O functions. These functions encompass physical ports like dual LAN (1GbE x 1, 2.5GbE x 1), three USB 3.2 Gen 2 Type-A ports, and one Type-C port. The Type-C port can be used for either DP 1.4 or as an additional USB 3.2 Gen 2 interface.

For expansion, the GENE-RAP6 offers M.2 slots with M, B, and E-Keys, allowing for storage, 5G, and Wi-Fi module installation. Additionally, the board features an FPC connector supporting a four-lane PCIe Gen 4 slot. With HDMI 2.1, DP 1.4, LVDS, and eDP 1.4, and the board's Intel® Iris® Xe Graphics, the GENE-RAP6 can support up to four simultaneous displays with exceptional clarity, making it suitable for a variety of image-intensive applications, such as clinical imaging or Human-Machine Interface (HMI) applications.



GENESYSM-RAP6

The GENESYSM-RAP6, a 3.5" SubCompact Board System, is a versatile and high-performance computing solution suitable for a range of vertical market applications. Powered by 13th Generation Intel® Core™/U-series Processors, this PC offers elite processing capabilities. The system features Intel® Iris® Xe Graphics and provides multiple high-resolution display options, including HDMI 2.1 for 8K and DP 1.4 for 7680 x 4320, both at 60Hz.

The GENESYSM-RAP6 also offers various connectivity options, including four USB 3.2 Gen 2 ports, RJ-45 ports for Intel® I219-LM at 1GbE and Intel® I226 at 2.5GbE, and two COM ports for RS-232/422/485.

For storage, the system supports 6Gb/s SATA, alongside an M.2 2280 M-Key slot that provides a four-lane PCIe Gen 4 interface. Optionally, TPM 2.0 enhances data security during transit when deployed as an industrial automation solution. Its support for wireless modules via M.2 B and E-Keys also enables edge-cloud communication.



UP Xtreme i12

The UP Xtreme i12, originally equipped with 12th Generation Intel® Core™ processors, has now become the standard-bearer for high performance within the UP board range. SKUs featuring 13th Gen Intel® Core™ CPUs have elevated the board's capabilities to new levels. The boost in processing capacity offered by the 13th Generation, along with the board's support for Intel® Iris® Xe graphics, provides users with a robust foundation for graphically intensive applications, such as AI-assisted clinical imaging.

New features available on 13th Generation SKUs include carrier board-based MIPI CSI cameras and HDMI-in pin wafers, which aid in end-to-end image acquisition. These join existing interfaces for peripheral cameras, such as dual LAN ports with Time-Sensitive Networking (TSN) support. In addition to wired connectivity, the board supports Wi-Fi 6 and 5G via M.2 2230 E and 3052 B-Key slots, as well as expandable storage and AI module support through two M.2 2280 M-Key slots. This makes the board a well-rounded solution that can be easily deployed in smart city applications.



UP Xtreme i12 Edge

Packing the efficient multicore architecture of 13th Generation Intel® Core™ Processors, onboard LPDDR5, and flexible display capabilities into a fanless edge system, the UP Xtreme i12 Edge is a powerful yet remarkably compact Mini PC. It comes equipped with a variety of interfaces, including one USB 4.0, three USB 3.2, and two LAN ports (1x 2.5GbE, 1x GbE), providing high-speed connectivity for peripheral devices.

The inclusion of a 40-pin GPIO and COM ports supporting RS-232/422/485 functions grants access to communication protocols necessary for industrial applications requiring time-sensitive inter-machine communication. The system's onboard TPM 2.0 provides data security during transit.

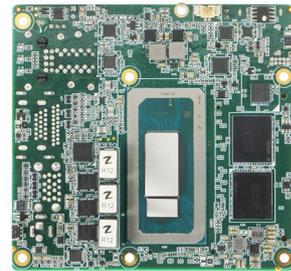
The PC's fanless design and optional VESA and wall mount kits offer additional protection against environmental wear and tear while also facilitating easy integration into existing projects. This is further enhanced by its wide 12V ~ 36V power input.



UP Squared i12

Measuring a mere 85.6mm × 90mm, the UP Squared i12 is the world's smallest single-board computer powered by 13th Generation Intel® Core™ CPUs. Designed to offer flexibility for a range of projects, the UP Squared i12 boasts remarkably dense I/O, which, on 13th Gen SKUs, includes new features like pin wafers for MIPI CSI cameras and HDMI-in, along with stacked HDMI 1.4 and DP 1.2 ports. An additional DP 1.4 output is also available via the board's USB Type-C, making it well-suited for machine vision solutions.

The UP Squared i12 is also equipped with a Raspberry Pi-compatible 40-pin GPIO header, expanding its capabilities beyond the traditional barebones-style tinker board and enabling a wider range of functions for users to take advantage of more options for application development. Adding to this expansion is the board's flexible storage, featuring an onboard 128GB SSD as the foundation, which can be easily augmented with a SATA HDD and an M.2 2280 M-Key for NVMe.



UP Squared i12 Edge

The UP Squared i12 Edge is a compact Mini PC, measuring just 130mm x 94mm x 68mm. It offers VESA and wall mounting options for easy and discreet integration while providing a rich array of connectors, including three USB 3.2 Gen 2 ports, dual RJ-45 ports for Realtek RTL8111H-CG gigabit ethernet, and a combination of HDMI and DP ports for multiple display outputs.

The UP Squared i12 Edge hosts the same flexible storage options as its board-level counterpart, featuring a 128GB SSD onboard, SATA support, and an M.2 2280 M-Key for NVMe. Further expansion features, such as an optional M.2 2230 E-Key, provide accessibility to Wi-Fi. Alternatively, the PC's M.2 2280 M-Key can accommodate AI accelerator modules to enhance the AI capabilities of its 13th Generation Intel® Core™ CPU for edge-based operations, while still retaining wireless data exchange, thanks to the protection afforded by onboard TPM 2.0 and its M.2 2230 E-Key's CNVi support.



HPC-RPSC

The COM-HPC computer-on-module standard was introduced with a focus on high-performance computing, a focus that is reflected in all aspects of the HPC-RPSC. Hosting socket-type 13th Generation Intel® Core™ CPUs with a power rating of up to 65W, the HPC-RPSC is equipped to leverage the advantages of up to 24 cores (8 P-cores, 16 E-cores) and 32 threads.

The board features a total of six USB 3.2 ports, with two of them operating at 20Gbps, eight USB 2.0 ports, and dual LAN ports for Intel® I226-LM for 2.5GbE. The HPC-RPSC can also support up to four simultaneous 4K displays via one eDP and three DDI ports, with data transmission expedited by its flexible SODIMM-based, ECC-supported DDR5 system memory.

One of the most impressive aspects of the HPC-RPSC is its expansion capabilities, featuring three PCIe 4.0 and eight PCIe 3.0 slots, offering extensive storage options, along with two SATA drives. Additionally, the board includes a 16-lane PEG 5.0 port, capable of accommodating advanced graphics cards for high-intensity tasks.



MIX-Q670D1

The MIX-Q670D1 is a high-performance, DC-powered Mini-ITX motherboard that combines versatile connection options and broad expandability with a low-profile board design. It supports up to 64GB of dual-channel DDR5 memory via SODIMM slots, ensuring high-bandwidth data transmission for maximizing the board's extensive I/O capabilities.

Designed with pin headers for RS-232/422/485, RS-232, digital I/O, and LVDS or eDP, the MIX-Q670D1 retains a wealth of functionality while maintaining a low-profile form factor. Despite its compact size, onboard physical ports provide substantial functionality, including four USB 3.2 Gen 2 ports, two gigabit ethernet ports, two HDMI ports, and two DP 1.2 ports. Both the HDMI and DP ports offer 4K display output at 60Hz and are configurable for simultaneous use in conjunction with the board's LVDS or eDP connector.

Equipped with an M.2 2232 E-Key and M.2 3042/3052 B-Key, the MIX-Q670D1 allows for AI and 5G module integration. It also provides an M.2 2280 M-Key slot and dual SATA bays with Intel® VMD support for the installation of performance-boosted NVMe and PCIe modules, offering a wide range of storage management options.



MAX-Q670A

Compatible with 13th Generation Intel® Core™ LGA1700 Socket Processors up to 125W, the MAX-Q670A is an incredibly powerful Micro-ATX motherboard. It comes equipped with a wide array of outputs to harness the high-performance processing of the new Intel® platform, including up to four LAN ports with data rates of up to 2.5GbE, a DB-9 COM port, five RS-232 pin headers, and both physical and internal USB interfaces with speeds reaching 20Gbps.

Thanks to the variety of processors it supports, the MAX-Q670A is also capable of hosting a flexible arrangement of PCIe slots. This includes two PCIe Gen 5 slots, along with one Gen 4 and Gen 3 slot each. These slots offer a variety of functions or can serve as backup storage options, in addition to the board's support for eight SATA drives and two M.2 2242/2280 M-Key slots, all of which support RAID 0, 1, 5, and 10.



ATX-Q670A

Supporting four dual-channel DDR5 DIMM slots, two PCIe [x16] expansion ports, and four independent 4K displays, the ATX-Q670A leads the industry in both performance and market potential. A bootable USB feature enhances the rich rear I/O, which includes three USB 3.2 Gen 2 and two USB 3.2 Gen 1 ports, along with one USB Type-C port. Other onboard interfaces include dual LAN ports and a DB-9 port for RS-232/422/485.

The ATX-Q670A contains eight SATA drives that support RAID 0, 1, 5, and 10, alongside two M.2 M-Key slots for exceptional storage capacity. Its processor selection can handle the very fastest SSDs. For functional expansion, the board offers two PCIe [x16] slots alongside both a PCIe [x4] and PCIe [x1] slot, in addition to a further three PCI slots. With this configuration, the ATX-Q670A can take advantage of advanced graphics cards for the purposes of video capture and AI calculations, making it suitable for deployment in demanding applications.





Conclusion

The 13th Generation Intel® Core™ Processor Family and the associated range of embedded computing solutions represent a significant leap in performance, versatility, and efficiency. AAEON's adoption of this technology has produced a range of products that each bring unique advantages to the table, catering to diverse application needs. In summary, AAEON's diverse lineup of solutions featuring 13th Generation Intel® Core™ Processors empower embedded computing systems to achieve enhanced functionality, AI workload management, and responsiveness, ultimately pushing the boundaries of what is possible in the world of embedded applications.

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.aeon.com.

¹Intel Ark - Intel® Core™ i9-13900H Processor - Specifications

²Source Intel: As estimated by measurements made using SPECint_rate_base2017_IC2022.1 (1-copy & n-copy) using Intel validation Platforms comparing Core i9-13900K versus Core i9-12900K

³Intel Ark - Intel® Core™ i9-13900KS Processor - Specifications