

Solution Brief

Industrial Enterprise
Computer-on-Module (COM) Boards



Computer-on-Module Flexibility at the Edge

Kontron COM Express® and COM-HPC® modules with 13th Gen Intel® Core™ mobile processors deliver powerful performance, AI, and graphics with portfolio flexibility for industrial-grade deployments.



Computer-on-module (COM) solutions layer together a module with processor and memory onto a carrier board that hosts the system's I/O connections. COM solutions offer exceptional flexibility and cost efficiency by allowing system builders and operators to swap out the COM module to accommodate the latest-generation processors. This upgrade can be accomplished while leaving the carrier board and I/O connections intact. The COM market is steadily growing, driven by Industry 4.0 automation and the need for higher output, with a market valuation of USD 2.24B in 2022 that is forecasted to grow at a compound annual growth rate (CAGR) of 12.4 percent to reach USD 4.52B by 2028.¹

"We see a lot of potential in the 13th Gen Intel® Core™ processor platform, which is why we've invested in it for so many form factors across COM Express® and COM-HPC®."

—Peter Müller, VP of Product Center
Modules, Kontron

Challenge: Driving consistent performance for demanding applications

Unlike tightly controlled data center environments, deployments for industrial automation, smart edge retail, healthcare, city applications, and aerospace face challenging environmental conditions. In factory settings, shock and vibration from machinery and assembly lines imperil system integrity. Outdoor settings in smart city applications must accommodate weather conditions such as extreme heat, cold, rain, wind, and dust. And in retail or healthcare settings, physical space is at a premium, and technology needs to be small enough to fit anywhere while still delivering the performance to support AI and computer vision. These challenges make it difficult for businesses to deploy advanced IoT applications, such as AI or Time-Sensitive Networking (TSN) at the edge, without significant risk.

Solution: Upgradeable edge performance reintroduces key industrial-grade features²

Businesses that adopt COMs can take advantage of fast and scalable custom designs that also satisfy the unique challenges of IoT edge environments, such as exposure to shock, vibration, heat, weather, and space constraints. Kontron offers the latest 13th Gen Intel® Core™ mobile processors with a selection of COM Express® and COM-HPC® modules in varying form factors to suit the needs of OEMs, ODMs, and their customers.



This latest-generation processor platform includes key industrial-grade features² that bring enhanced compute power to the harshest, most challenging environments. “We see a lot of potential in the 13th Gen Intel® Core™ processor platform, which is why we’ve invested in it for so many form factors across COM Express and COM-HPC,” says Peter

Müller, VP of Product Center Modules at Kontron. “One of the key innovations here is bringing the Intel® Core™ platform to the COM Express mini form factor, which we previously only offered with Intel Atom® processors. This will be a huge step up in compute and graphical performance.”

Key use cases for Kontron COM Express® and COM-HPC® solutions

The 13th Gen Intel® Core™ mobile processor platform delivers powerful compute and AI performance for space-constrained deployments and reintroduces industrial-grade features² on select SKUs.



Industrial manufacturing



Logistics equipment automation



Healthcare AI, patient monitoring, and ultrasound



Smart city, IoT gateways, and smart retail



Federal, aerospace, and defense

How it works

Kontron offers 13th Gen Intel Core mobile processors up and down the SKU lineup across four size modules: COM Express basic, compact, and mini and COM-HPC client size A. These offerings give OEM and ODM manufacturers choice and flexibility to develop solutions that meet their customers’ unique needs. The 13th Gen Intel Core mobile processor features a soldered-down BGA package for durability in harsh environments. On select offerings, Kontron also solders down memory modules for added integrity.

Smooth multitasking with performance hybrid architecture³

13th Gen Intel Core mobile processors feature up to 14 cores and 20 threads with performance hybrid architecture.³ This design process combines multithread Performance-cores (P-cores) for primary workloads, with single-thread Efficiency-cores (E-cores) built for background tasks and functions. Intel® Thread Director⁴ intelligently allocates workloads between P-cores or E-cores for optimized performance. This specification frees up more CPU cycles for essential tasks and high efficiency, especially when running advanced workloads such as AI in small-form-factor deployments at the edge.

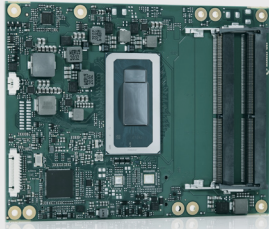
Reintegrating industrial-grade features for challenging environments

The previous generation of Intel Core processors for IoT lacked key industrial-grade features that are reintroduced with the 13th Gen Intel Core platform. These features include compliance with industrial use conditions of 100 percent operation over 10 years, support for in-band error correction code (IB ECC) memory, and extended ambient temperature ranges of -40°C to 85°C with the Kontron board. (Note that 13th Gen Intel Core mobile processors are rated at -40°C to 100°C TjMax.) This generation also offers support for Intel® Time Coordinated Computing (Intel® TCC)² for latency-bounded workloads that are important for industrial controls applications. Kontron boards also make use of the processor’s support for up to 2.5GbE discrete connectivity to enable TSN use cases such as robotics and conveyor belt/machine appliance coordination.

DDR5 memory and the first mobile generation with PCIe 5.0

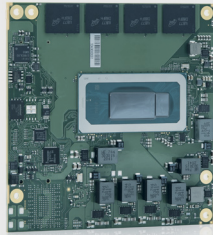
Select H-series SKUs in the 13th Gen Intel Core mobile processor lineup are the first mobile processors to introduce PCIe 5.0 connectivity for fast data movement across peripherals and add-in cards. The larger memory bandwidth of DDR5 and LPDDR5x-6400⁵ also supports more simultaneous applications to drive platform consolidation in IoT devices with a small footprint.

Kontron solutions with 13th Gen Intel® Core™ mobile processors



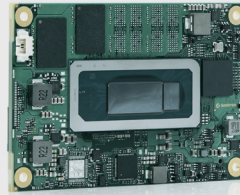
**COM Express®
basic form factor**

Kontron COMe-brp6 E2
(pin-out Type 6 compliant)



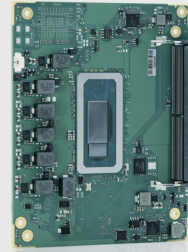
**COM Express®
compact form factor**

Kontron COMe-crp6 E2
(pin-out Type 6 compliant)



**COM Express®
mini form factor**

Kontron COMe-mrp10 E2
(pin-out Type 10 compliant)



COM-HPC® client size A

Kontron COMh-caRP
(95 x 120 mm)

Kontron solutions – Key features across all modules:

- 13th Gen Intel Core mobile processor with up to 96 execution units (EUs) of Intel® Iris® Xe graphics²
- Up to 64 GB LPDDR5(x)⁵ non-ECC memory soldered down (up to 64 GB DDR5 non-ECC memory via 2x SODIMM sockets on COM Express® basic), IBEC on dedicated SKUs
- Select offerings (E2 versions) of each size with industrial-grade temperature range (-40°C to 85°C)
- Up to 4x 4K independent display support (up to 2x 4K on COM Express mini) or 1x 8K
- Optional support for Intel vPro® platform, TPM, NVMe SSD onboard
- Support for USB-C (optional), LVDS/eDP, up to 2.5GbE with TSN, WOL, SATA 6 GB/s, USB 3.2 Gen 2, and audio and common features, including SPI, I2C, and SMB

Rich graphics performance with Intel Iris Xe graphics²

Graphics performance is important for edge deployments such as multiple displays in retail video walls, high-resolution diagnostic images in healthcare, or human-machine interfaces in industrial environments. 13th Gen Intel Core mobile processors feature Intel Iris Xe graphics with up to 96 graphics EUs for fast and powerful visual processing. The platform also supports up to four display pipes, which translate into quad independent display support with 4K resolutions (or one display up to 8K resolution) in both the basic and compact COM Express offerings from Kontron.

Accelerated AI for fast inference at the edge

The high number of graphics EUs also supports highly parallel AI workload processing in compact edge platforms. This acceleration combined with support for the Intel® Distribution of OpenVINO™ toolkit helps optimize AI inference further for efficient object recognition in use cases including smart city, smart retail, healthcare, and industrial manufacturing. Given the space constraints and need for simple yet durable devices in these environments, powerful AI processing in the CPU helps reduce the dependence on external accelerators.

High investment value from long-life availability⁶

Intel delivers long-life availability on IoT SKUs,⁶ making it easier to support solution providers and OEMs/ODMs with a steady supply of 13th Gen Intel Core processors for today's and tomorrow's deployments. For regulated industries such as healthcare and aerospace, certification cycles can take up years of a typical product's life cycle. Long-life availability helps ensure more value from technology investments well beyond the initial certification period, forgoing the hassle of new product introductions and lengthening the duration between upgrades.

Better multitasking in industrial deployments

Performance hybrid architecture³ on select Intel-enabled Kontron solutions enables more simultaneous applications and better multitasking to drive operational technology (OT) convergence. This allows factory operators to implement fewer appliances in areas where physical space is limited while supporting more-advanced and compute-intensive use cases on the same hardware:

- AI video analytics for automated defect detection
- High-definition displays for human-machine interfaces (HMIs)
- Robotic control, Time-Sensitive Networking, and functional safety

Conclusion: COM convenience meets 13th Gen Intel Core mobile processor performance

Solution providers and customers can deploy high-performance systems, expansive I/O, DDR5 memory bandwidth, and powerful graphics and AI in a flexible portfolio of COM form factors with these Kontron offerings. The reintroduction of industrial-grade features² helps reduce risk and cost in the most challenging environments with robust systems designed to withstand heat, cold, shock, and vibration. Intel and Kontron make it easy to get the compute and graphics performance where you need it, even in the most difficult edge IoT spaces and use cases.

Get started

Learn more about 13th Gen Intel Core mobile processors at intel.com/13thgencoremobile-iot.

Explore Kontron COM Express and COM-HPC solutions at kontron.com/en/products/boards-standard-form-factors/c136841.

About Kontron

Kontron is a global leader in IoT embedded computing technology, offering individual IoT solutions through a combined portfolio of hardware, software, and services. Kontron provides secure and innovative applications that benefit customers in a wide variety of industries with fast time to market, low total cost of ownership, and extended product life cycles.

kontron.com



1. "GLOBAL COMPUTER ON MODULE INDUSTRY RESEARCH REPORT, GROWTH TRENDS AND COMPETITIVE ANALYSIS 2022-2028," 360 Research Reports, October 2022, 360researchreports.com/global-computer-on-module-industry-21832598.
2. Available on select SKUs.
3. Performance hybrid architecture combines two new core microarchitectures, Performance-cores (P-cores) and Efficient-cores (E-cores), on a single processor die. Select 13th Gen Intel® Core™ processors (certain 13th Gen Intel® Core™ i3 processors and lower) do not have performance hybrid architecture, only P-cores.
4. Built into the hardware, Intel® Thread Director is provided only in performance hybrid architecture configurations of 13th Gen Intel® Core™ processors. OS enablement is required. Available features and functionality vary by OS.
5. LPDDR5x DRAMs operating in LPDDR5 speed mode are supported.
6. Intel does not commit or guarantee product availability or software support by way of road map guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Contact your Intel account rep for additional information.

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Not all features are available on all SKUs.

Not all features are supported in every operating system.

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