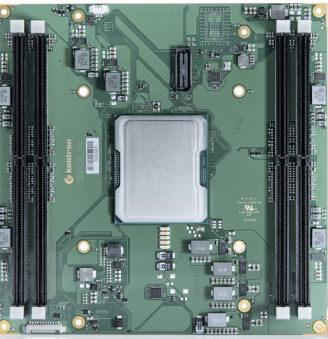# Computer-on-Module for High Performance Computing

The usage of standardized Computer-on-Modules in the embedded market shows a long history of success – the best example is COM Express®, the successful and worldwide leading standard for Computer-on-Modules since 2005.

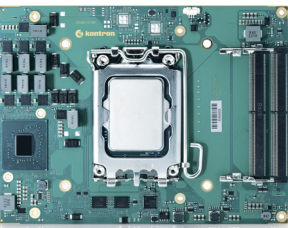However today the embedded market is facing new challenges.

Applications such as artificial intelligence, the upcoming 5G wireless standard come with enormous data hunger and require more computing power. Leading manufacturers in the industry, such as Kontron, have set up a new working group in the PICMG standardization committee to make the COM standard fit for the future. Computer-On-Modules High Performance Computing – COM-HPC – will be complementary to the existing COM Express® standard.
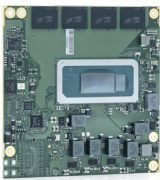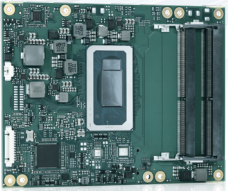
> Standardized high performance platforms for the embedded market

> COM-HPC®/Client
High Performance general purpose computing

> COM-HPC®/Server
Focus to high ethernet bandwiths and high PCIe lane count

COM-HPC Size D

COM-HPC Size C

COM-HPC Size A
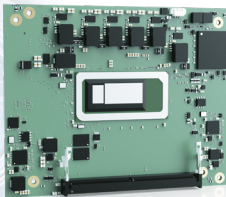

COM Express® compact
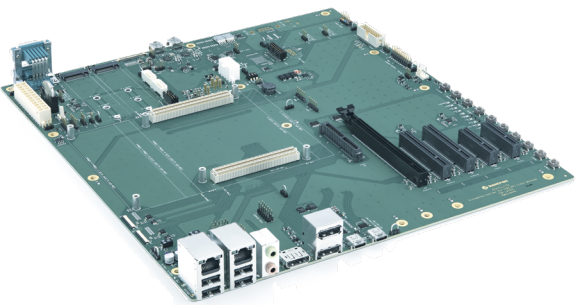

COM Express® basic

COM-HPC® Evaluation Carrier

An evaluation carrier is essential for ensuring customers quickly become familiar with the new technology and properly assess the COM-HPC® platform as a potential solution for their own system applications.

> **COM-HPC®/Client**
Evaluation Carrier

> Support of 48 PCIe lanes via various PCIe and m.2 slots
> 2x 10/1GBase-T interface
> 2x USB Gen 4 + 2x USB 3.2 Gen 2x1, 2x SATA
> 3x DisplayPort, 1x eDP, 2x MIPI-CSI
> BIOS POST-Code display
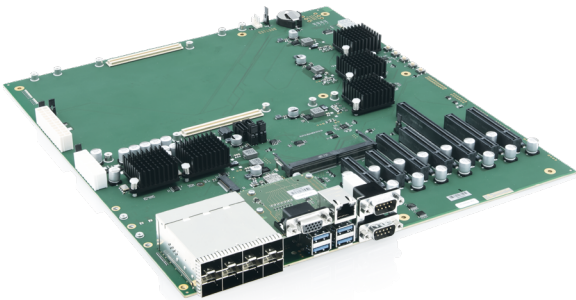
> **COM-HPC®/Server**
Evaluation Carrier

> Support of 65x PCIe lanes via various PCIe card connectors
> Support of 8x 10/25G Ethernet ports:
> 8x 10/25G Ethernet via integrated re-timer support to SFP28 cages
> 1x 10/1GBase-T interface
> BMC expansion slot
> 1x 10/1GBase-T interface
> 4x USB 3.2 Gen2.1, 2x SATA
> BIOS POST-Code display

About Kontron

Kontron is a global leader in IoT/Embedded Computing Technology (ECT) and offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

For more information, please visit: www.kontron.com

About the Intel® Partner Alliance

From modular components to market-ready systems, Intel and the over 1,000+ global member companies of the Intel® Partner Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Close collaboration with Intel and each other enables Alliance members to innovate with the latest IoT technologies, helping developers deliver first-in-market solutions.

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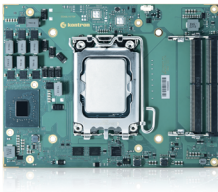

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Computer-on-Module
for High Performance Computing

	COMh-ccAS	COMh-caRP	COMh-caAP	COMh-sdID
COMPLIANCE	COM HPC® Client, Size C	COM HPC® Client, Size A	COM HPC® Client, Size A	COM-HPC® Server, Size D
DIMENSIONS	160 x 120 mm	95 x 120 mm	95 x 120 mm	160 x 160 mm
CPU (SoC)	Intel® Core™ S processors (formerly Alder Lake S)	Intel® Core™ processors (formerly Raptor Lake U/P/H)	Intel® Core™ processors (formerly Alder Lake P)	Intel Xeon® D-2700 Processor Series
CHIPSET	Intel® 600 Series Chipset Family	Intel® 600/700 Series Chipset Family - On-Package Platform Controller Hub	Intel® 600 Series Chipset Family - On-Package Platform Controller Hub	-
MAIN MEMORY	2x DDR5 SODIMM for up to 64 GByte ECC / non ECC on request: 4x DDR5 SODIMM for up to 128 GByte ECC / non ECC	2x DDR5 SODIMM dual channel up to 32 GByte ECC or non ECC	2x DDR5 SODIMM dual channel up to 64 GByte ECC or non ECC	4x DDR4 DIMM sockets for up to 256 GByte RDIMM (512 GByte planned)
GRAPHICS CONTROLLER	Intel® UHD Graphics 770 driven by Xe-architecture, with up to 32 EUs, 4 Independent Displays (up to 8K)	Intel® Iris Xe Graphics architecture with up to 96 EUs, 4 Independent Displays (up to 8K)	Intel® Iris Xe Graphics architecture with up to 96 EUs, 4 Independent Displays (up to 8K)	-
ETHERNET CONTROLLER	2x Intel® I226 or 1x Intel® I226, 1x integrated MAC with GPY215	Intel® i226	Up to 2x Intel® i226	Intel® I226-LM/IT Intel® 2x Quad 25GbE LAN integrated in SoC
ETHERNET	2x 2.5 Gb Ethernet with TSN & WOL support	Up to 2x 2.5 Gb Ethernet with TSN & WOL support (depending on SKU)	Up to 2x 2.5 Gb Ethernet with TSN & WOL support (depending on SKU)	1x 1/2.5 Gb Ethernet with TSN & WOL support 8x Ethernet ports supporting versatile configurations: 100GbE/2x 50GbE/4x 25GbE/2x 25GbE + 4x 10GbE/8x 10GbE
STORAGE	2x SATA 6Gb/s	2x SATA 6Gb/s (optional)	2x SATA 6Gb/s	2x SATA 6Gb/s
FLASH ONBOARD	–	Up to 1 TByte NVMe SSD (on request)	Up to 1 TByte NVMe SSD (on request)	Up to 1 TByte NVMe SSD (on request)
PCI Express®	16x PCIe Gen 5.0 lanes (for high performance CPUs) + 8x PCIe Gen 4.0 lanes + 6x PCIe Gen 3.0 lanes	1x 8 PCIe Gen 4.0 (Alder Lake H-Series, 35-45 W) 2x 4 PCIe Gen 4.0 -> 1x 4 shared with onboard NVMe 8x PCIe Gen3.0 Optional 1x PCIe for BMC	1x 8 PCIe Gen 4.0 (Alder Lake H-Series, 35-45 W) 2x 4 PCIe Gen 4.0 -> 1x4 shared with onboard NVMe 6+2x PCIe Gen 3.0 via HSIO (shared with SATA) Optional 1x PCIe for BMC	32x PCIe Gen4 (2 x16, 4 x8, 8 x4) 16x PCIe Gen3 (2 x8, 4 x4, 8 x2)
DISPLAY	DDI1: DP++, DDI2: DP++, DDI3: DP++, eDP	DDI1: DP++, DDI2: DP++, DDI3: DP++, eDP (DSI, BIOS option), MIPI DSI	DDI1: DP++, DDI2: DP++, DDI3: DP++, eDP (DSI, BIOS option), MIPI DSI	-
USB	4x (2x) USB 3.2	2x USB 4.0/ Thunderbolt ™; 2x USB 3.2; 8x USB 2.0	2x USB 4.0/ Thunderbolt ™; 2x USB 3.2; 8x USB 2.0	4x USB 3.0 / USB 2.0
SERIAL	2x serial interface	2x serial interface (RX/TX only)	2x serial interface	2x serial interface
AUDIO	Soundwire	4x Sound wire, I2S (HW option: Option HD Audio instead of 2x sound wire)	4x Soundwire, I2S (HW option: Option HD Audio instead of 2x Soundwire)	-
OTHER FEATURES	SPI, eSPI, Fast I²C, SMB, Staged Watchdog, RTC	(G) SPI, SMB, Fast I²C, Staged Watchdog, RTC	SPI, eSPI, Fast I²C, SMB, Staged Watchdog, RTC	SPI, eSPI, Fast I²C, SMB, Staged Watchdog, RTC
SPECIAL FEATURES	TPM 2.0, Fail-Safe via 2nd SPI Flash	Trusted Platform Module TPM 2.0	TPM 2.0, Fail-Safe via 2nd SPI Flash	TPM 2.0, Fail-Safe via 2nd SPI Flash
FEATURES ON REQUEST	additional 3rd and 4th SODIMM socket, vPRO (AMT/TXT/AES Support), up to 2x PCIe x1 additional w/o Ethernet	vPRO (AMT/TXT/AES Support), up to 3x PCIe x1 additional w/o Ethernet & SATA, NVMe SSD, Fail Save via 2nd SPI Flash	vPRO (AMT/TXT/AES Support), up to 3x PCIe x1 additional w/o Ethernet & SATA, NVMe SSD	NVMe SSD
POWER MANAGEMENT	ACPI 6.0	ACPI 6.0	ACPI 6.0	ACPI 6.0
POWER SUPPLY	12 V ATX and/or Single Supply Power	8.5 V – 20 V Wide Range, Single Supply Power	8.5 V – 20 V Wide Range, Single Supply Power	12V DC
BIOS	AMI UEFI	AMI UEFI	AMI UEFI	AMI UEFI
OPERATING SYSTEM	Windows®10, Linux, VxWorks (on request)	Windows®10, Linux, VxWorks	Windows®10, Linux, VxWorks (on request)	Linux. Windows 10 IoT Enterprise, Windows Server 2022
TEMPERATURE	Commercial temperature: 0 °C to +60 °C operating, -30 °C to +85 °C non-operating Optional E1: -25 °C to +75 °C operating, -40 °C to +85 °C non-operating	Industrial temperature: -40 °C to +85 °C operating, -40 °C to +85 °C non-operating	Commercial temperature: 0 °C to +60 °C operating, -30 °C to +85 °C non-operating Optional E1: -25 °C to +75 °C operating, -40 °C to +85 °C non-operating	Commercial temperature: 0 °C to +60 °C operating, -30 °C to +80 °C non-operating Industrial temperature: -40 °C to +80 °C operating, -40 °C to +80 °C non-operating
HUMIDITY	93 % relative Humidity at 40 °C, non-condensing (according to IEC 60068-2-78)	93 % relative Humidity at 40 °C, non-condensing (according to IEC 60068-2-78)	93 % relative Humidity at 40 °C, non-condensing (according to IEC 60068-2-78)	93 % relative Humidity at 40 °C, non-condensing (according to IEC 60068-2-78)

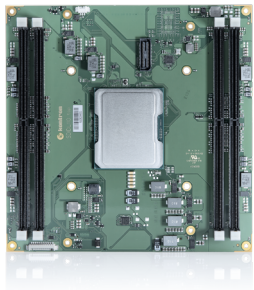> **Socketed, now also usable for 13th Generation Intel® Core™ Processors**
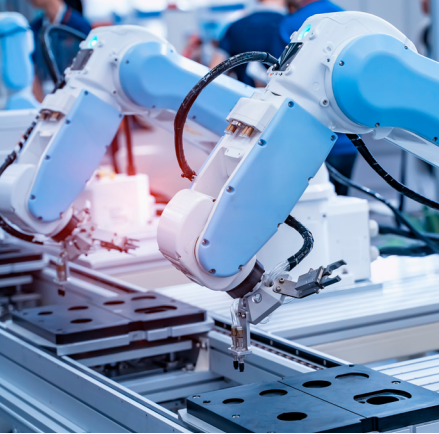
COM-HPC®
Typical Use Cases

❯ Server Modules

High performance multi-core processors and multi-LAN support up to 40G/100G Ethernet
❯ 5G RAN platforms
❯ Network appliances
❯ Datacenter switching with high speed uplinks

Processing power combined with High-Speed Ethernet connectivity
❯ Surface inspection
❯ Assembly control
❯ Pattern recognition
❯ Robot control

Typical COM-HPC® Server Modules use cases are foreseen in embedded servers ruggedised for field use, autonomous vehicles, outdoor cellular base stations, geophysical field equipment, medical equipment and defence systems as well as test & measurements and automation applications.

❯ Client Modules

Multiple PCIe lanes combined with High-Speed LAN connectivity and PCIe x16 ports for high performance GPGPUs/FPGAs:
❯ AI – machine learning + camera inspection
❯ Test & Measurement
❯ Autonomous driving & Truck Fleet control
❯ Data logger
❯ Automotive test equipment

COM-HPC® Client Modules can be used effectively in a range of high-end embedded client products requiring one or more displays. Typical uses are in Networking, Automation, Measurement, and AI applications for medical equipment, high-end instrumentation, industrial equipment, casino gaming equipment, ruggedised field PCs, transportation and defence systems.