

Delivering Performance, Scalability, and Resilience at the Edge

Built on 11th Gen Intel® Core™ processors, Congatec's conga-TS570 COM Express Type 6 and conga-HPC/cTLH COM-HPC Client modules bring near-real-time performance, scalability, security, and resilience to a new class of edge computing applications.



"When compared to chip-level designs, a customized system based on an adapted carrier board is just a fraction of the design work. It's less of a design risk as well while providing an extremely fast time to market."

—Christian Eder, director of marketing for EMEA at Congatec and chairman of the PICMG COM-HPC Subcommittee

Today's digital economy is expanding rapidly at the edge, with a new generation of compute-hungry systems and devices being deployed around the globe. While modern industrial applications are delivering new levels of productivity and automation for businesses and consumers everywhere, they are also generating vast amounts of data that must be managed, leveraged, and protected at the edge. Featuring 11th Gen Intel® Core™, Intel® Xeon® W-11000E Series, and Intel® Celeron® processors, Congatec's conga-TS570 COM Express Type 6 module and conga-HPC/cTLH COM-HPC Client Type module enable the near-real-time performance, security, scalability, and extended temperature ranges required to power advanced industrial edge systems and applications anywhere in the world.

Challenge: Meeting the need for high performance computing anywhere

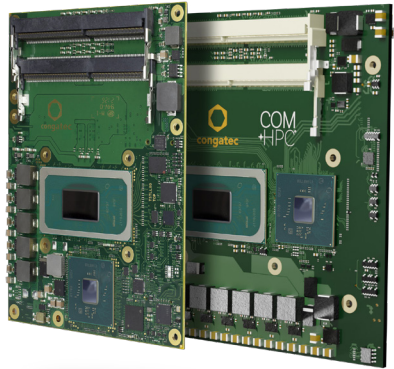
Secure, high-performance computing must be delivered in unconventional settings and remote locales today to power use cases ranging from manufacturing robotics and warehouse automation to AI and medical imaging. Transportation systems deployed on aircraft, ships, trains, and all manner of vehicles must perform optimally while withstanding environmental hazards such as heat, humidity, dust, corrosion, altitude, movement, and even impact. Consider also the durability required by modern test and measurement systems that must operate with resilience and precision 24/7 in extreme temperatures. To meet today's computing demands, OEMs and their customers must design increasingly sophisticated, modular systems that accelerate processing while ensuring the resilience, extensibility, security, and reliability that tomorrow's applications will require.

Solution: Congatec conga-TS570 COM Express Type 6 and conga-HPC/cTLH COM-HPC Client modules

Featuring 11th Gen Intel Core, Intel Xeon W-11000E Series, and Intel Celeron processors, Congatec's conga-TS570 COM Express Type 6 and conga-HPC/cTLH COM-HPC Client modules are engineered to drive industrial applications across multiple business segments with all the performance, security, scalability, resilience, and interoperability they require. Their modular design allows standard PC core functionality to be separated from the customized extensions for optimum flexibility and faster time to market. Designed according to PICMG specifications, Congatec modules can be easily upgraded with new CPU generations as they emerge simply by switching out the module.

How it works

Congatec modules empower OEMs and their customers with the quality components and advanced features they need to customize carrier boards for their intended use cases. Low power consumption and near-real-time computing make them ideally suited for motion control systems, robotics, programmable logic controllers (PLC), and other industrial automation use cases. Quality components are embedded from end to end to ensure module longevity of 10 years or more, an essential requirement for medical imaging systems and other healthcare solutions requiring long qualification cycles. Support for near-real-time hypervisors enables system consolidation so multiple operating systems can be processed simultaneously.



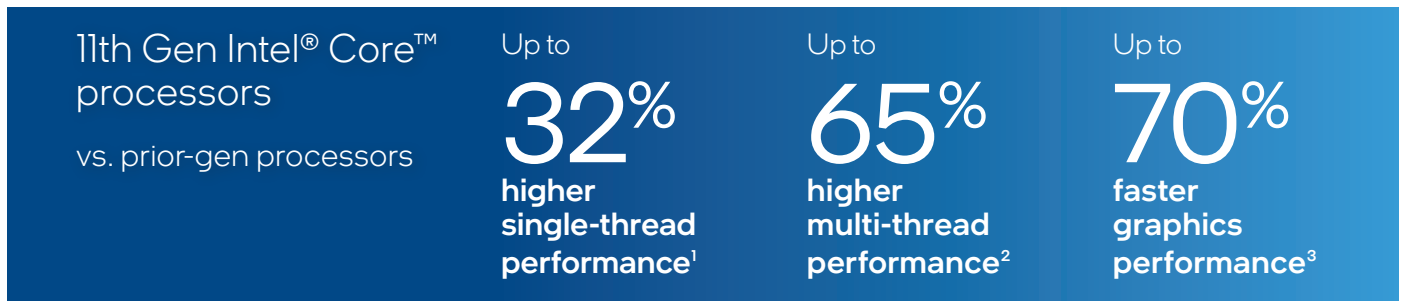
These and other advanced features are offered by the Congatec modules:

conga-TS570 COM Express Type 6	conga-HPC/cTLH COM-HPC Client Type
440-pin board-to-board connection (PICMG standard) for easy CPU scalability	800-pin board-to-board connection (PICMG standard) for easy CPU upgrades and greater scalability
Up to 96 GB DDR4 DRAM with 3200 MT/s memory and optional ECC	Up to 128 GB DDR4 DRAM with 3200 MT/s memory and optional ECC
8x PCIe Gen 3 lanes and PEG support for 16x PCIe Gen 4 lanes	20x PCIe Gen 3 lanes and 16x (PEG support) and 4x PCIe Gen 4 lanes
NVME SSD onboard (1 TB)	2x USB 4.0 ports for high data throughput
Congatec embedded UEFI	
Integrated Intel® UHD graphics, driving up to 3 DP++ interfaces	
One extra eDP port for a system-integrated flat panel	
Integrated i225 Ethernet controller supporting 2x 2.5 GB/s (fully TSN capable)	
Congatec cooling solution (passive and active) for reliable performance	

“With all the performance features of 11th Gen Intel® Core™, Intel® Xeon® W-11000E Series, and Intel® Celeron® processors, Congatec modules are perfect for high-performance industrial automation applications running in the harshest of environments. The COM Express module is a great choice for those looking to upgrade easily from previous-generation COM Express modules. COM-HPC achieves a new level of performance with the much higher I/O and scalability required to support future generations of Intel® technology. Both standards will be supported for years to come.”

—Andreas Bergbauer, senior product line manager at Congatec





See backup for configuration details. For more complete information about performance and benchmark results, visit intel.com/benchmarks.



Intel® processors drive high performance, resilience, and scalability at the edge

Congatec's conga-TS570 COM Express Type 6 and conga-HPC/cTLH COM-HPC Client modules feature 11th Gen Intel Core CPUs, which deliver significant generation-over-generation performance gains, including up to a 32 percent gain in single-thread performance,¹ up to a 65 percent gain in multithread performance,² and up to 70 percent faster graphics performance.³ These gains, and especially the boost in multithread performance, significantly accelerate processing for AI, robotics, and other data-intensive applications.

Support for high-throughput applications, rugged environments

11th Gen Intel Core, Intel Xeon W-11000E Series, and Intel Celeron processors support up to 20 PCIe Gen 4.0 lanes, four USB 4.0 ports, and 2x 2.5GbE interfaces to ensure the connectivity required for high-throughput industrial use cases. OEMs and their customers can now leverage these processors to create solutions that facilitate, for example, the high-speed interfaces used to process near-real-time data in autonomous robots. These processors perform reliably in the harshest of environments as well, withstanding elements such as wind, dust, corrosion, movement, impact, and extreme temperatures. As a result, they meet the wide-ranging demands of industrial applications deployed both indoors and outdoors, from warehouse automation solutions and smart cameras to manufacturing robots, medical diagnostic solutions, and test and measurement systems.

Intel® Time Coordinated Computing (Intel® TCC) for near-real time data processing

Select SKUs of 11th Gen Intel Core, Intel Xeon W-11000E Series, and Intel Celeron processors also support Intel TCC to help expedite processing for near-real-time workloads and Time-Sensitive Networking (TSN). This powerful solution allows Congatec's conga-TS570 COM Express Type 6 and conga-HPC/cTLH COM-HPC Client modules to improve deterministic computing by synchronizing data and execution across the network. To simplify real-time tuning for

proprietary and open-source systems, Intel provides tools, libraries, and APIs. Supported real-time hypervisors and operating systems include Wind River VxWorks and Real-Time Systems.

Advanced features for fast AI processing

Exclusive to Intel processors, Intel® Advanced Vector Extensions 512 (Intel® AVX-512) accelerates AI workloads for rapid image analysis, audio/video processing, and cryptography. Intel® Deep Learning Boost (Intel® DL Boost) further extends Intel AVX-512 with a new instruction set that increases inference performance on lower-precision data types, such as those used in workloads for image classification, speech recognition, and object detection.

Expansive application support, near-real-time data transfers

The computing performance delivered by 11th Gen Intel Core processors powers a breadth of industrial use cases that require near-real-time data transfers to the CPU, including industrial edge servers, multidevice, real-time control systems, multicamera computer vision, and deep learning inference systems.

Key features offered by the 11th Gen Intel processors include:

- Third-generation, Intel® 10nm SuperFin technology, up to 8 CPU cores, and up to 4.7 GHz frequency
- Intel® UHD Graphics with up to 32 EUs, 4x4K or 1x8K displays, and up to 2 video-decode boxes (VDBoxes), which hold the hardware blocks for encode and decode functions
- Intel® TCC and Time-Sensitive Networking (TSN) for real-time computing
- Intel® Functional Safety Essential Design Package (Intel® FSEDP) to facilitate platform certification
- Embedded and extended temperature industrial-rated SKUs
- Integrated Thunderbolt™ 4/USB4, 20 lanes of PCIe Gen 4.0, Intel® discrete Wi-Fi 6E/Bluetooth 5.2
- Hardware-based security with Intel® Total Memory Encryption (Intel® TME)
- Supported by Intel® oneAPI toolkits, Intel® Distribution of OpenVINO™ toolkit, and Intel® TCC Tools
- Support for both commercial and open source operating systems, real-time OS, and hypervisors

Layers of security help protect data at the chip level

The volume of sensitive consumer, business, and public sector data being generated today is rapidly increasing at the edge. To mitigate risk, organizations must secure their data according to the world's most stringent global security protocols and regulations. Select SKUs of 11th Gen Intel Core, Intel Xeon W-11000E Series, and Intel Celeron processors deliver all the advanced hardware-enabled security needed to help protect data all the way down to the chip level:

- **Intel® Total Memory Encryption (Intel® TME)** enables full physical memory encryption. This helps defend against hardware-level attacks such as cold boot, freeze spray, and DIMM removal.
- **Intel® Boot Guard and Intel® Trusted Execution Technology (Intel® TXT)** help establish a secure boot and provide the foundation for safe computing.
- **Intel® Key Locker** helps protect encrypted keys and decrypt/encrypt operations.
- **Real-Time Hypervisor** can help improve security, with one core acting as a firewall or gateway where all external data passes. This complete, independent operating system is typically a small-footprint Linux.

Learn more

Explore the capabilities of Congatec modules at congatec.com/tiger-lake-h-modules, or contact info@congatec.com to get started.

Discover the value of the 11th Gen Intel Core, Intel Xeon W-11000E Series, and Intel Celeron processors at intel.com/tigerlake-h.

Conclusion: Powering Industry 4.0 with Intel and Congatec

Today's edge computing solutions are transforming businesses and economies in exciting new ways. Built on 11th Gen Intel Core processors, Congatec's conga-TS570 COM Express Type 6 and conga-HPC/cTLH COM-HPC Client modules are engineered to deliver the superior performance, security, scalability, and resilience needed to meet the unique demands of today's most complex industrial use cases. With high-speed processing, quality components throughout, yet low power consumption, the Congatec modules give OEMs and their customers the building blocks required to drive innovation and bring it to market quickly, advancing the future of industrial automation on many fronts.

About Congatec

Congatec is a rapidly growing technology company focusing on embedded computing products. The company's high-performance computer modules are used in a wide range of applications and devices in industrial automation, medical technology, transportation, telecommunications, and many other verticals.

congatec.com

"As an Intel Platinum Partner, Congatec has access to many of Intel's support offerings, including the Early Access Program, which allows us to collaborate on new technologies and speed our products to market. Intel's technical support team is an outstanding resource for Congatec as well."

—Gerhard Edi, CTO at Congatec



1. Up to 32 percent single thread performance gains as measured by SPECrate2017_int_base (1-copy)IC19_0u4 (est.).
2. Up to 65 percent multithread gain as measured by SPECrate2017_int_base (n-copy)IC19_0u4 (est.).
3. Up to 70 percent graphics performance gains as measured by 3DMark_v2.11 - Win10 v2009 - Fire Strike - graphics score.

Intel Configurations

Performance results are based on Intel measurements as of May 25, 2021.

Processor: Intel® Core™ i7-11850HE (TGL-H) PL1=45W TDP, 8C16T turbo up to 4.7 GHz
Graphics: Intel® Graphics Gen 12 GFX
Memory: 32 GB DDR4-3200
Storage: Intel® SSD 545S (512 GB)
OS: Windows 10 Pro 20H2
Bios: TGLSFW11.R00.4151.A01.2104060640 (Release date: 04/06/2021)
CPUz microcode: 28h

Processor: Intel® Core™ i7-9850HE (CFL-H) PL1=45W TDP, 4C8T turbo up to 4.4 GHz
Graphics: Intel® Graphics Gen 9 GFX
Memory: 32 GB DDR4-2666
Storage: Intel SSD 545S (512 GB)
OS: Windows 10 Pro 20H2
Bios: CNLSFWR1.R00.X216.B01.2006110406 (release date: 06/11/2020)
CPUz Microcode: D6h

For more complete information about performance and benchmark results, visit intel.com/benchmarks.

Notices and disclaimers

Intel® Advanced Vector Extensions (Intel® AVX) provides higher throughput to certain processor operations. Due to varying processor power characteristics, utilizing AVX instructions may cause, a) some parts to operate at less than the rated frequency and, b) some parts with Intel® Turbo Boost Technology 2.0 to not achieve any or maximum turbo frequencies. Performance varies depending on hardware, software, and system configuration, and you can learn more at intel.com/turboboost.

Performance varies by use, configuration and other factors. Learn more at www.intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

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