congatec

Product Guide

Official congatec partner:

DISTEC

A FORTEC GROUP MEMBER

#1 Vendor of Computer-on-Modules

Contents

ABOUT US

congatec is a growing technology company focusing on embedded computing products. The 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. With an excellent customer base from start-ups to international blue-chip companies.

As a global market leader in the computer-on-modules segment, congatec offers the industry's largest Computer-On-Module portfolio. Architectures include COM Express Type 6, -Type 7, -Type 10, and the new COM-HPC client and server modules, as well as SMARC and Qseven. In addition, congatec offers SFF industrial single board computers. Customer-specific design capability is also offered. Technology based on latest Intel, AMD and NXP processors.

Founded in 2004 and headquartered in Deggendorf, Germany, the company has additional 7 subsidiaries and over 300 employees globally ready to support our customers.

Pure Play strategy

- Focus on Computer-on-Modules
- Strongest COMs Roadmap in Industry
- Best COM Design-In Support
- Highest Design Quality

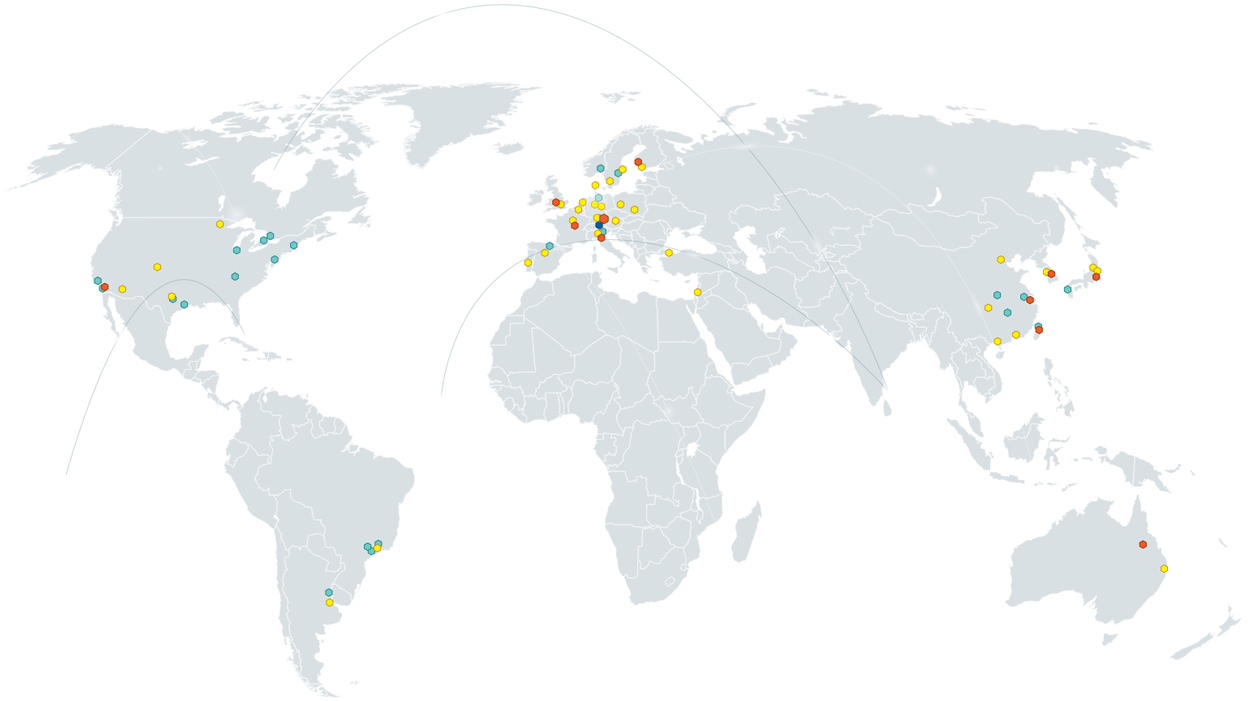
Innovator & thought leader

- Driver for new COM Standards
- Product Innovations
  - BIOS Tools
  - Cooling Solutions
  - Board Controller

Learn more

"Creating industry-leading embedded computing platforms for a more intelligent world."

We are international



congatec · Sales Partner · Technology Partner · Value Partner

Technology partnerships

Executive Member

Chairman of the PICMG COM-HPC workgroup

Design guide editor Rev. 1.0
Specification editor Rev. 2.0, 2.1, 3.0

Founding Member
Board Member

Specification editor
Rev. 2.0, 2.1

Founding member
Specification & design guide editor

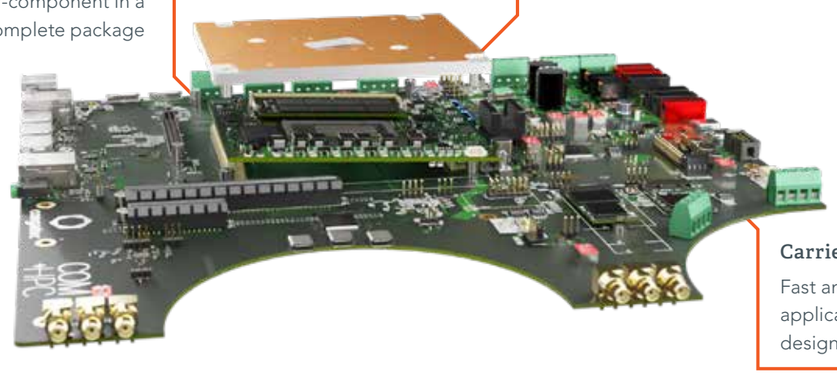
COMPUTER-ON-MODULES CONCEPT

Utilization of Computer-on-Modules is by far the most widely employed embedded design principle. It enables engineers to cost effectively design dedicated systems by combining application-specific carrier board designs with ready-to-use and easy-to-integrate modules. As super-components, these modules include all key building blocks such as CPU, GPU, and RAM as well as a broad set of standard interfaces in a function-validated complete package.

Depending on performance and space requirements, different Computer-on-Module form factor standards are available. Namely: COM-HPC, COM Express, SMARC and Qseven. Computer-on-Modules of the same standard are freely interchangeable, both across processor generations and between manufacturers. This gives designers full flexibility when scaling and upgrading solutions for a long-lasting return on NRE investments.

Computer-on-Modules
Function-validated super-component in a complete package

Cooling solutions
Tailored solutions available for all modules, from passive to active cooling



Carrier boards
Fast and cost-effective application-specific designs

Your Benefits

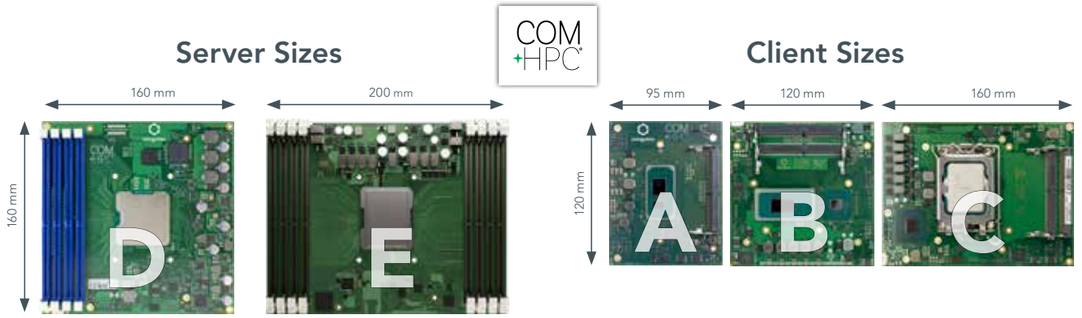
- Short time-to-market
- Low development costs
- High design security and long-term availability
- High scalability and easy upgrades
- Efficient re-use of existing building blocks
- Comprehensive design-in support

“Your fastest way to dedicated systems with high design security”

Learn more

COM-HPC – High-performance computing

COM-HPC is the latest high-end Computer-on-Module standard. It is hosted by the standardization body PICMG. COM-HPC targets high-performance edge servers and the next generation of heterogeneous multicore clients. It supports all the latest high-speed interfaces up to PCI Express 5.0, Thunderbolt, as well as 25 Gbit Ethernet. Depending on the application area, there are headless COM-HPC Server modules and COM-HPC Client variants with graphics support available.



“Your best choice for new applications requiring highest bandwidth and performance”

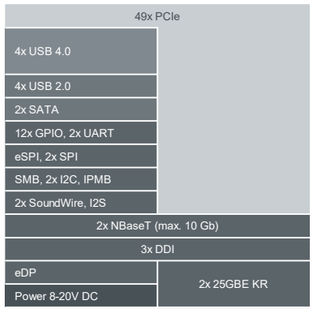
Learn more

COM-HPC Server – Boundless freedom for edge servers

COM-HPC Server defines two different form factors for the ultra-high end of embedded computing with up to 64 PCIe Lanes, 8x 2.5 Gbit/s Ethernet and up to 8 DRAM slots. They address the needs of edge and fog servers in harsh environments, ranging from industrial workload consolidation servers for automation, robotics, and medical backend imaging to outdoor servers for utilities and critical infrastructures as well as autonomous vehicles and video infrastructures for safety and security.

COM-HPC CLIENT – a quantum leap in client performance

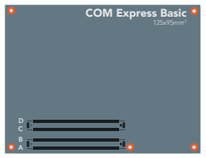
COM-HPC Client modules are available in three different form factors. Designed for high-end embedded and edge computing applications, they integrate latest multicore CPUs as well as GPUs for high-performance graphics and/or accelerating AI inference workloads. Target applications can be found in all next-generation high-end embedded systems, including embedded vision for which they offer also two MIPI-CSI interfaces.



COM EXPRESS – The most successful module standard

COM Express was launched in 2005 by the PICMG and is the most common Computer-on-Module standard today with the most elaborated ecosystem. The specification defines a family of three different pinouts and form factors targeting everything from dedicated server designs with up to 100 W TDP down to credit-card sized low power designs.

Server Class

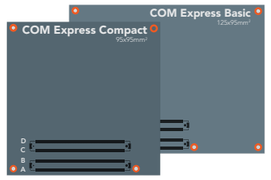


Gigabit Ethernet	4x USB 3.0
LPC / eSPI	
32x PCIe	
2x SATA	4x 10GBaseKR
4x USB 2.0	
8x GPIO / SDIO	
2x SER / CAN	
SPI & I2C	
Power	Power

COM Express Type 7 – Server-on-Modules

Headless COM Express Type 7 Server-on-Modules target embedded edge and fog servers and support up to 4x10 GbE and 32x high-speed PCIe Gen 3.0 lanes. congatec offers a 100-watt ecosystem with application-ready cooling solutions to simplify the design-in of these most powerful COM Express modules.

Performance Class



Gigabit Ethernet	4x USB 3.0
LPC	
8x PCIe	
HDA	PEG x16
LVDS / eDP	
ExpressCard	
4x SATA	3x DDI
8x USB 2.0	
8x GPIO / SDIO	
2x SER / CAN	
SPI & I2C	
Power	Power

COM Express Type 6 – Computer-on-Modules

COM Express Type 6 Computer-on-Modules are the ideal choice for the entire range of embedded computing applications and are available from low power to the latest multicore technology from Intel and AMD. Coming in two different form factors, they offer all that is needed to build everything from powerful PLCs, HMIs, shop-floor systems to high-end digital signage systems and high-performance medical equipment.

Low Power Class

Gigabit Ethernet
LPC
4x PCIe
HDA
LVDS 1x24 / eDP
DDI
2x SATA
8x USB 2.0 / 2x USB 3.0
8x GPIO / SDIO
2x SER / CAN
SPI & I2C
Power

COM Express Type 10 – Mini modules

COM Express Mini with Type 10 pinout completes the set of COM Express specifications for small form factor designs. These credit-card sized modules are focused on low power processors. As the same connector technology and design guides are leveraged across the entire COM Express ecosystem, developers can reuse all major specifications and functions, which beside the small size, is the main advantage of the Mini specification.

"Your most versatile building blocks, from entry level embedded servers to battery powered mobile devices"

Learn more

SMARC Module – The high-end among small form factors

SMARC is the latest Computer-on-Module standard defined by the SGET. It addresses the high end of space-constrained low-power applications. SMARC modules are available with x86 technology as well as Arm based SoCs. With its 314-pin connector SMARC supports a broad range of interfaces despite its small form factor of a mere 82 mm × 50 mm.

The technical highlights of SMARC 2.1

Defining up to 4x interfaces and 4x MIPI CSI, SMARC 2.1 meets the growing demand for a fusion of embedded computing and embedded vision. Up to 4x Gbit Ethernet, support of hardware-based IEEE 1588 Precision Time Protocol (PTP) and the ability to host wireless interfaces like WLAN and Bluetooth off the module make this standard an ideal fit for any IoT connected industrial application. And thanks to CAN bus support, SMARC is also well prepared for in-vehicle applications.

All these features make SMARC your best choice for the next generation of small form factor designs based on low-power x86 or Arm processors.

4x Gigabit Ethernet[1]
4x PCIe[1]
4x MIPI CSI[2]
HDA + 2x I2S
2x LVDS/eDP/MIPI DSI
DP++/HDMI + DP++
1x SATA
6x USB 2.0 + 2x USB 3.0
14x GPIO + 1x SDIO
4x SER + 2x CAN
eSPI + QSPI
SPI + I2C
Power

[1] 2x ETH & 4x PCIe or 4x ETH & 2x PCIe
[2] 2x Flatfoil Connector

Learn more

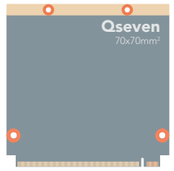
"Your intelligent module standard for high-performance small form factor applications"

QSEVEN – For deeply embedded low power designs

Qseven is the second leading Computer-on-Modules standard hosted by the SGET. Leveraging a less complex connector to the carrier board compared to SMARC, Qseven simplifies more deeply embedded industrial designs, such as those found in IoT gateways, cost-optimized HMIs, and retail systems.

The technical highlights of Qseven

Qseven supports both x86 and Arm processor technology and comes with optimized industrial interface support, including up to 2x USB 3.0, 8x USB 2.0 and up to 4x serial interfaces or CAN bus. In addition, up to two MIPI-CSI cameras can be connected to the module via a flat foil connector. Qseven further provides a Gigabit Ethernet port for Internet connection and supports up to three independent displays. We recommend using Qseven for updates and upgrades of your existing applications. For new designs, OEMs should also evaluate our extensive SMARC portfolio.



- Gigabit Ethernet
- LPC
- 4x PCIe
- HDA / I2S
- LVDS 2x24 / eDP
- 2x MIPI CSI (Flatfoil)
- DDI
- 2x SATA
- 8x USB 2.0 / 2x USB 3.0
- 8x GPIO / SDIO
- 2x SER / CAN
- SPI / I2C
- Power

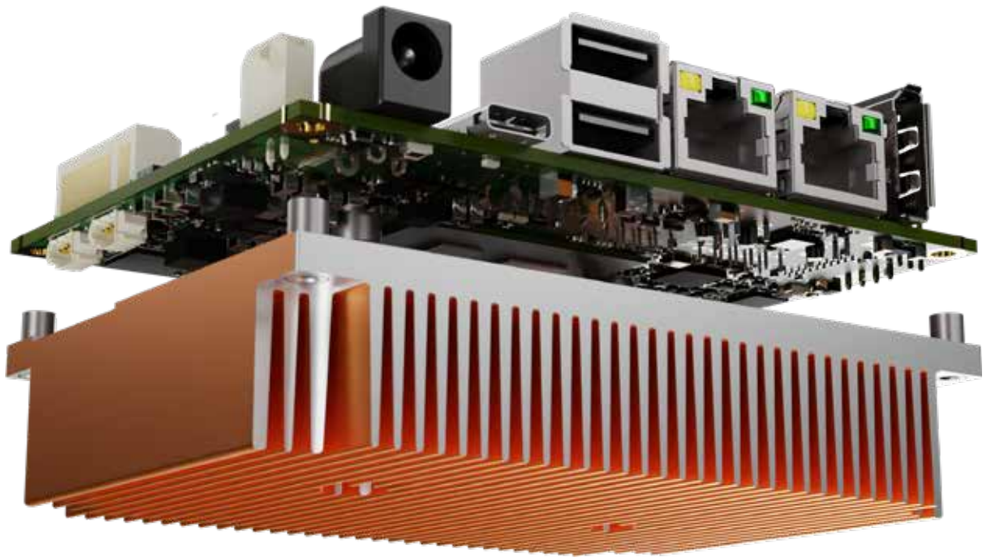
Learn more

“Your industrial-grade module standard for deeply embedded rugged designs”

SINGLE BOARD COMPUTERS

Industrial-grade Single Board Computers are the fastest way to integrate rugged embedded computing technology into any design. Available in three different form factors – Mini-ITX, 3,5-inch and Pico-ITX – such SBCs offer a broad range of interfaces to applications that require a standard industrial socket set.

Based on 15+ years of embedded experience, congatec’s industrial-grade SBCs excel with carefully selected components like ceramic capacitors and sophisticated layout for extended lifetime and 24/7 reliability. They come off the shelf with comprehensive board support packages and design-in support. Equipped with the same low-power embedded Intel processors we also use on congatec Computer-on-Modules, our SBCs feature an extraordinary performance-per-watt ratio, as independent tests have proven[1].



[1] https://www.elektormagazine.com/news/conga-jc370-juke

Your Benefits

- Fully industrial-grade design for highest reliability
- Extended temperature range support (from –40 °C to +85°C)
- Long-term availability of 10+ years
- Customization of hardware and BIOS / UEFI on request

“Your fastest way to reliable embedded applications”

FIRMWARE FEATURES

Embedded computer users usually require more than the standard functionality of an office computer. congatec has taken these requirements into account when designing. Based on our large amount of BIOS and UEFI experience, we have implemented the embedded requirements into our powerful congatec platform.

congatec Board Controller

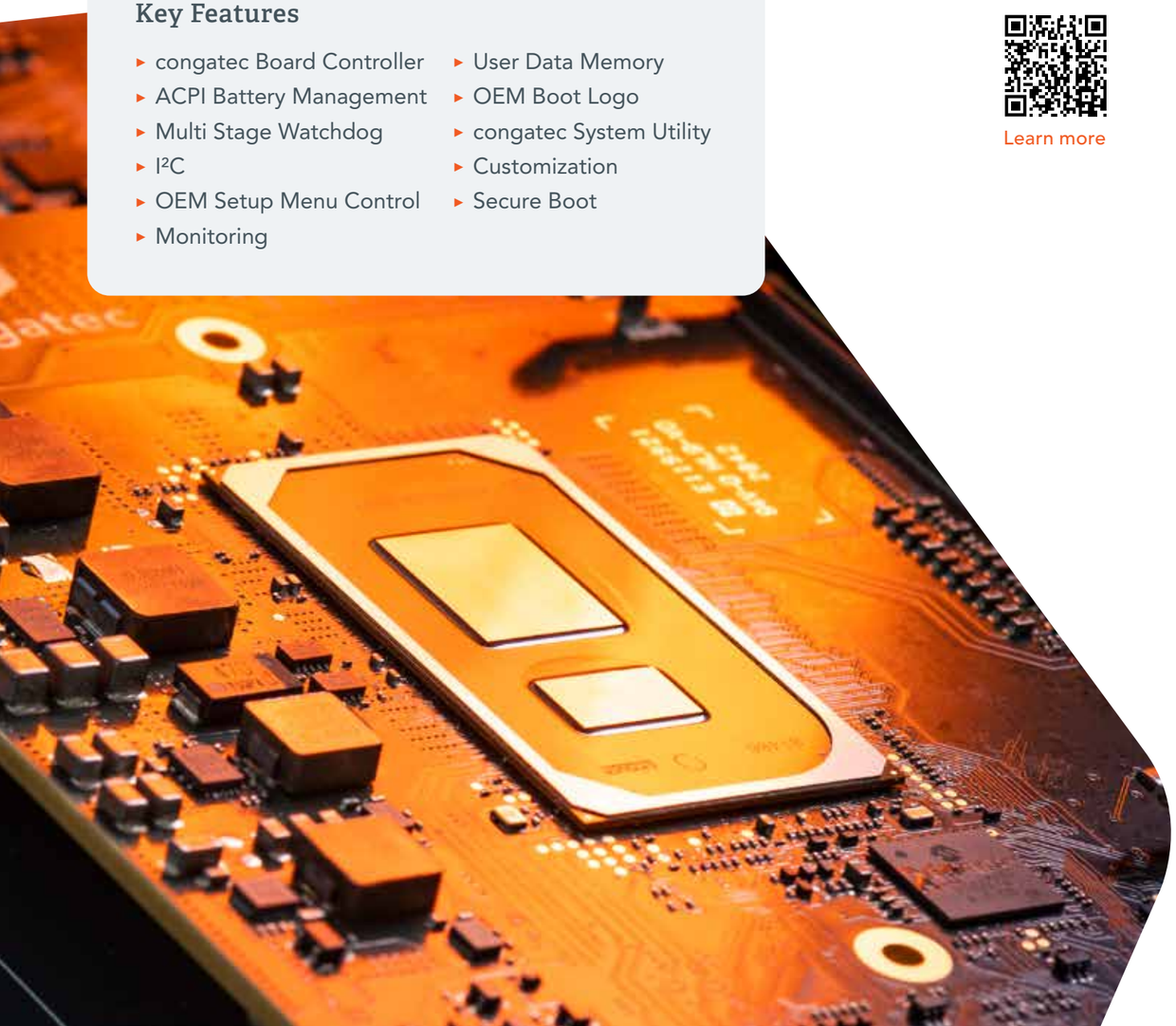
An onboard micro controller fully isolates most of the embedded features, such as system monitoring, multi stage watchdog or the I²C bus, from the x86 core architecture.

"Be independent and keep control by using congatec Firmware."

Key Features

- congatec Board Controller
- ACPI Battery Management
- Multi Stage Watchdog
- I²C
- OEM Setup Menu Control
- Monitoring
- User Data Memory
- OEM Boot Logo
- congatec System Utility
- Customization
- Secure Boot

Learn more



REAL-TIME HYPERVISOR

Harness the power of today's multi-core processors with the innovative Real-Time Systems Hypervisor. The powerful software is proven in thousands of systems worldwide. It permits multiple real-time and general-purpose operating systems to run concurrently on multi-core x86 processors. Designers attain increased flexibility in system design and remarkable enhancements to functionality and performance. This reduces both time to market and overall system costs.

Multiple systems – hard real-time

- Simultaneous operation of real-time and general-purpose operating systems
- Hard real-time
- Definable boot sequence
- Reboot of any OS at any time
- Determinism and maximum throughput with secure OS separation
- Use of existing OS device drivers and standard development tools

Hardware access

- Non-Uniform Memory Access (NUMA)
- Disk and disk partition assignment (AHCI/NVMe controller sharing)
- USB port assignment (xHCI controller sharing)
- Separation and locking of shared caches with Time Coordinated Computing (TCC)
- Seamless integration of commercial Fieldbus, EtherCat, TSN, etc.

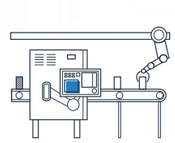
"Partition where you can. Virtualize where you have to."

Your Benefits

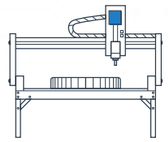
- Reduced system costs and physical size
- Shorter time to market, maximum productivity
- Secure design
- Full flexibility in system functionality
- Seamless operation out of the box, also with COTS and proprietary OSs
- Longer mean time between failure
- Support from low-power modules to multi-socket servers

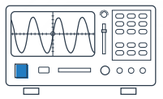
Applications

Robotics



Industrial automation



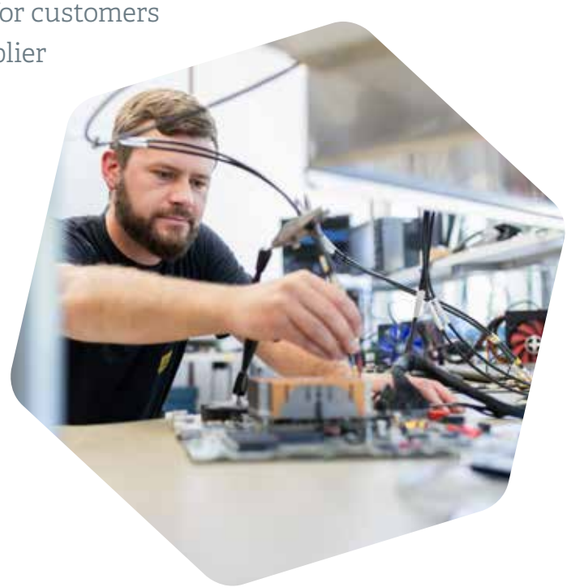


Test & measurement systems

Learn more

CONGATEC DESIGN SERVICES – FOR CUSTOMIZED DESIGN

Existing know-how and infrastructure make it possible for customers to outsource custom designs to congatec. As a single supplier covering the complete range of cost-effective standard solutions to individual customized projects, congatec supports the full range of technology platforms – from x86 to ARM and from standard form factors i.e. COM Express or Pico-ITX to full customized board designs. For customized projects congatec acts as a service provider supporting the specific system designs of customers.



congatec's Customizing Services

congatec's embedded customizing support starts at the design phase and includes project management, the development of specific hardware and software, production control, system integration and global logistics, as well as the provision of technical support.

Customization
- of Single Board Computers
- of Computer-On-Modules

Modification
Special BIOS/UEFI/Firmware features or settings

Design
- of Carrier Boards
- of Full Custom Hardware
- of Cooling Solutions
- of Mechanics

System Integration
Including Tests and Certifications

Manufacturing
Efficient High Quality Production Services

congatec as Outsourcing Partner

Overview
- Mutually define system requirements
- Create product concept
- Provide detailed design including supply chain
- Turnkey delivery for the complete product life cycle

Benefits
- Leverages congatec embedded computing expertise
- Improves time to market and reduces development cost
- Simplifies customers supply chain
- congatec manages the entire product life cycle
- Intellectual property remains with the customer

congatec supports customer developments throughout the entire product life cycles. Customers benefit from congatec's rich experience as a manufacturer of high quality computer modules with synergistic effects leading to reduced development time and cost.

Learn more

CONGATEC TECHNICAL SERVICES

Services for the Project Definition Phase

Product Selection Support
SBC, COM or full custom design? Forward looking I/O selection, ...

Design-In Training
Engineering trainings covering all aspects for carrier board designs

Services for the Design Phase

Design Guides
In depth best practice solutions

Component Selection
Support to find the right functionality, costs, availability, ...

Schematic Review
Check the design to recognize problems at an early stage

Layout Review
Detailed check and best practice advice from our specialists

Signal Integrity Simulation
High speed simulation allows layout adjustments before the first prototypes are produced

BIOS/UEFI/Firmware Customization
Implementation of customized features or settings

Bring-Up Support
congatec engineering support to bring life to the first prototypes quickly

Services for the Validation Phase

Signal Integrity Analysis
Signal integrity analysis of high speed interfaces such as PCI Express 6.0, Thunderbolt, USB, ...

Thermal Solutions
Optimized cooling solutions featuring heat stacks, heat pipes or vapor chambers

Customized Article Handling
Handling of manufacturing and logistics requirements

Pre-EMC Measurement
Pre-EMC Measurement and engineering support to optimize the designs to EMC requirements

MTBF
Reliability calculations based on different standards i.e. Telcordia 4, SN 29500, ...

Information Sources

Users Guides
Accurate and detailed product-related information

Design Guides
Deep technical "how to" for carrier boards, battery managers, and more

Application & Tech Notes
Detailed description of congatec tools and features as well as detailed module specific information

Reference Schematics
Schematics and layout files to be used as a blueprint for your carrier board designs

Learn more

SERVER-ON-MODULES

Embedded high-performance computing

conga-HPC/sILH

conga-HPC/sILL

conga-B7XI

Formfactor	COM HPC Server Size D			COM HPC Server Size D		COM Express Basic Type 7
CPU	Intel® XEON® D-2700 processors			Intel® XEON® D-1700 processors		
	Intel® Xeon® D-2796TE | 20x Cores / 40x Threads | 30MB Cache | 118W TDP Intel® Xeon® D-2775TE | 16x Cores / 32x Threads | 25MB Cache | 100W TDP Intel® Xeon® D-2752TER | 12x Cores / 24x Threads | 20MB Cache | 77W TDP Intel® Xeon® D-2733NT | 8x Cores / 16x Threads | 15MB Cache | 80W TDP Intel® Xeon® D-2712T | 4x Cores / 8x Threads | 15MB Cache | 65W TDP			Intel® Xeon® D-1746TER | 10x Cores / 20x Threads | 15MB Cache | 67W TDP Intel® Xeon® D-1732TE | 8x Cores / 16x Threads | 15MB Cache | 52W TDP Intel® Xeon® D-1715TER | 4x Cores / 8x Threads | 10MB Cache | 50W TDP Intel® Xeon® D-1735TR | 8x Cores / 16x Threads | 15MB Cache | 59W TDP Intel® Xeon® D-1712TR | 4x Cores / 8x Threads | 10MB Cache | 40W TDP		
DRAM	4x DIMM sockets for DDR4 memory modules | Max. capacity = 1TB			4x DIMM sockets for DDR4 memory modules | Max. capacity = 256GB		up to 4x SODIMM sockets for DDR4 memory modules up to 32GByte | Max. capacity = 128GB
	Memory Type RDIMM LRDIMM VLP RDIMM UDIMM (ECC) UDIMM (Non-ECC	DIMM Capacity 8GB – 64GB 64GB – 128GB 8GB – 64GB 8GB – 32GB 4GB – 32GB	Max. DIMM Speed 2933 MT/s 2933 MT/s 2666 MT/s 2666 MT/s 2666 MT/s	Memory Type RDIMM LRDIMM VLP RDIMM UDIMM (ECC) UDIMM (Non-ECC)	DIMM Capacity 8GB – 64GB 64GB – 128GB 8GB – 64GB 8GB – 32GB 4GB – 32GB	Max. DIMM Speed 2933 MT/s 2933 MT/s 2400 MT/s 2666 MT/s 2666 MT/s
Ethernet	1x 2.5GbE TSN Ethernet 8x 25G/10G/2.5G/1G/100M lanes | Maximum total bandwidth 100Gb*			1x 2.5GbE TSN Ethernet 4x 25G/10G/2.5G/1G/100M lanes | Maximum total bandwidth 100Gb*		1x 2.5GbE TSN Ethernet 4x 10GbE supporting CEI/ KR/SF
Serial ATA	2x SATA III (6Gb/s)					
PCI Express Gen	32x PCIe Gen4 16x PCIe Gen3			16x PCIe Gen4 16x PCIe Gen3		16x PCIe Gen4 16x PCIe Gen3
USB	4x USB 3.0 | 4x USB 2.0			4x USB 3.0 | 4x USB 2.0		
Other	2x UART | 12x GPIO | 2x SM Bus | 2x I²C					2x UART | 8x GPIO | SPI
congatec Board Controller	Multi-stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control | Hardware Health Monitoring | POST Code redirection					
Embedded BIOS Feature	AMI Aptio® UEFI firmware | 64 Mbyte serial SPI with congatec Embedded BIOS feature | OEM Logo | OEM CMOS default settings | LCD Control | Display Auto Detection | Backlight Control | Flash Update					
Security	Trusted Platform Module (TPM 2.0)					
Power Managment	ACPI 5.0 with battery support					
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Microsoft® Windows IoT 10 Core | Linux | Android | Yocto | RTS Hypervisor					
Temperature	Commercial: Operating Temperature: 0°C to +60°C* | Storage: -20°C to +80°C* Industrial: Operating Temperature: -40°C to +80°C* | Storage: -40°C to +80°C*					
Humidity	Operating: 10 .. 90°C r. H. non cond		Storage: 5 - 95% r.H non cond.			
Size	160 x 200 mm			160 x 160 mm		125 x 95 mm

*Depending on CPU

conga-B7AC

conga-B7XD

conga-B7E3

Formfactor	COM Express Basic 95 x 125 mm², Type 7		
CPU	Intel® Atom™ Processor C3000 Family ("Deverton")	Intel® Xeon® Processor D-1500 Family ("Broadwell DE")	AMD EPYC™ Embedded 3000 Series
	Operating temperature commercial: 0 .. +60°C		
	Atom C3958 | 16x2.0 GHz | Cache 16MB | 31W Atom C3858 | 12x2.0 GHz | Cache 12MB | 25W Atom C3758 | 8x2.2 GHz | Cache 16MB | 25W Atom C3558 | 4x2.2 GHz | Cache 8MB | 16W Atom C3538 | 4x2.1 GHz | Cache 8MB | 15W Atom C3308 | 2x1.6 GHz | Cache 4MB | 9.5W	Xeon D-1577 | 16x1.3/2.1 GHz | Cache 24MB | 45W Xeon D-1567 | 12x2.1/2.7 GHz | Cache 18MB | 65W Xeon D-1548 | 8x2.0/2.6 GHz | Cache 12MB | 45W Xeon D-1527 | 4x2.2/2.7 GHz | Cache 6MB | 35W Pentium D-1509 | 2x1.5/2.7 GHz | Cache 3MB | 19W Pentium D-1508 | 2x2.2/2.6 GHz | Cache 3MB | 25W	EPYC3451 | 16x2.1/3.0 GHz | Cache 32MB | 100W EPYC3351 | 12x| 1.9/3.0 GHz | Cache 32 MB | 80W EPYC3251 | 8x2.5/3.1 GHz | Cache 16MB | 55W EPYC3201 | 8x1.5/3.1 GHz | Cache 16MB | 30W EPYC3151 | 4x2.7/2.9 GHz | Cache 16MB | 45W EPYC3101 | 4x| 2.1/2.9 GHz | Cache 8MB | 35W
	Operating temperature industrial: -40 .. +85°C		
	Atom C3808 12x2.0 GHz | Cache 12MB | 25W Atom C3708 8x1.7 GHz | Cache 16MB | 17W Atom C3508 4x1.6 GHz | Cache 8MB | 11.5W	Xeon D1559 12x1.5/2.1 GHz | Cache 18MB | 45W Xeon D1539 8x1.6/2.2 GHz | Cache 12MB | 35W Xeon D1529 4x1.3 GHz | Cache 6MB | 20W Pentium D1519 4x1.5/2.1 GHz | Cache 6MB | 25W	EPYC 3255 | 8x2.5/3.1 GHz | Cache 32MB | 55W
DRAM	3 SO-DIMM sockets for DDR4 memory modules up to 96 GByte 2133 MT/s ECC or non-ECC	3 SO-DIMM sockets for DDR4 memory modules up to 48 GByte 2400 MT/s ECC or non-ECC	3 SO-DIMM sockets for DDR4 memory modules up to 96 GByte 2666 MT/s ECC or non-ECC
Chipset	Integrated in SoC		
Ethernet	4x 10GBe with KR Interface support 1x GbE Intel I210 Ethernet Controller	2x 10GBaseKR 1x GbE Intel I210 Ethernet Controller	4x 10GBaseKR 1x GbE Intel I210 Ethernet Controller
Serial ATA	2x	2x	2x
PCI Express Gen 3.0|2.0	12x | 8x	24x | 8x	up to 32x Gen 3.0, depending on CPU version
USB 3.1 |3.0|2.0	- | 2x | 4x	- | 4x | 4x	4x | - | 4x
Other	LPC, SPI, I²C, 2xUART, SMBus, NC-SI		
Mass Storage	eMMC 5.0 onboard flash up to128 GByte (optional)		Up to 1 TByte onboard NVMe storage
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | BIOS Setup | Data Backup | I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control		
Embedded BIOS Feature	AMI-Aptio UEFI BIOS, congatec Embedded BIOS		
Security	"Trusted Platform Module" (TPM 2.0)		
	Intel® Quick Assist Technology Hardware integrated encryption engine		Secure Root of Trust, Secure Memory Encryption, Secure Encrypted Virtualization
Power Management	ACPI 5.0 compliant, Smart Battery Management		
Operating Systems	Microsoft® Windows Server 2016 , 2012, 2012 R2, 2008 R2 SP1 | Microsoft® Windows 10 Enterprise | Microsoft® Windows 8.1 64b | RHEL 6.6 & 7.1 | SuSE 11 SP4 & 12 SP1 | Fedora 22 | Ubuntu 14.10 | CentOS 6.6 & 7.1 FreeBSD | Vmware | Hyper-V | Xen | ESXi		Microsoft® Windows 10 Enterprise | Windows Server 2016 | Real-Time Hypervisor | Yocto | Linux (Ubuntu, Red Hat Enterprise Linux Server)
Temperature	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C		
Humidity	Operating: 10 .. 90°C r. H. non cond Storage: 5 - 95% r.H non cond.		

PERFORMANCE CLASS

Fast and energy efficient

intel partner Titanium

conga-HPC/cALS

conga-HPC/cALP

conga-TC670

Formfactor	COM HPC Client Size C	COM HPC Client Size A	COM Express Compact
CPU	12th Gen Intel® Core™ processors (Alder Lake)		
	Intel® Core™ i9 12900E | 8x 2.3/5.0 GHz P-Cores | 8x 1.7/3.8 GHz E-Cores | 30MB Smart Cache | 65W TDP Intel® Core™ i7 12700E | 8x 2.1/4.8 GHz P-Cores | 4x 1.6/3.6 GHz E-Cores | 25MB Smart Cache | 65W TDP Intel® Core™ i5 12500E | 6x 2.9/4.5 GHz P-Cores | 18MB Smart Cache | 65W TDP Intel® Core™ i3 12100E | 4x 3.2/4.2 GHz P-Cores | 12MB Smart Cache | 65W TDP	Intel® Core™ i7-12800HE | 6x 2.4/4.6GHz P-Cores | 8x 1.8/3.5GHz E-cores | 24MB Smart Cache | 45W TDP Intel® Core™ i7-1270PE | 4x 1.8G/4.5GHz P-Cores | 8x 1.2/3.3GHz E-cores | 18MB Smart Cache | 28W TDP Intel® Core™ i7-1265UE | 2x 2.6/4.7GHz P-Cores | 8x 1.2/3.5GHz E-cores | 12MB Smart Cache | 15W TDP Intel® Core™ i5-12600HE | 4x 2.5/4.5GHz P-Cores | 8x 1.8/3.3GHz E-cores | 18MB Smart Cache | 45W TDP Intel® Core™ i5-1250PE | 4x 1.7/4.4GHz P-Cores | 8x 1.2/3.2GHz E-cores | 12MB Smart Cache | 28W TDP Intel® Core™ i5-1245UE | 2x 2.5/4.4GHz P-Cores | 8x 1.1/3.3GHz E-cores | 12MB Smart Cache | 15W TDP Intel® Core™ i3-12300HE | 4x 1.9/4.3GHz P-Cores | 4x 1.5/3.3GHz E-cores | 12MB Smart Cache | 45W TDP Intel® Core™ i3-1220PE | 4x 1.5/4.2GHz P-Cores | 4x 1.1/3.1GHz E-cores | 12MB Smart Cache | 28W TDP Intel® Core™ i3-1215UE | 2x 1.2/4.4GHz P-Cores | 4x 0.9/3.3GHz E-cores | 10MB Smart Cache | 15W TDP Intel® Celeron® 7305E | 1x 1.0GHz P-Core | 4x 0.9GHz E-cores | 8MB Smart Cache | 15W TDP	
Chipset	Intel® R680E | Intel® Q670E	integrated in SOC	
DRAM	4 SO-DIMM sockets for DDR5 memory modules up to 32 GByte each (128 GByte system capacity)	2 SO-DIMM sockets for DDR5 memory modules up to 32 GByte each (max. 64 GByte system capacity) | up to 4800 MT/s	
Ethernet	2x 2.5 GbE TSN Ethernet (via Intel® i225 LM)		2.5 GbE TSN Ethernet (vial Intel® i225 LM)
Serial ATA	up to 2x SATA III (6Gb/s)		
PCI Express Gen 3.0	x16 PCIe Gen 5 (PEG port) up to 4 x4 PCIe Gen 4 up to 3 x4 PCIe Gen3	up to x8 PCIe Gen4 (PEG port) 2 x4 PCIe Gen4 up to 8 PCIe Gen3	up to x8 PCIe Gen4 (PEG port) 8 PCIe Gen3
USB	4x USB 3.2 Gen2 | 8x USB 2.0	2x USB 3.2 | 8x USB 2.0	up to 4x USB 3.2 | 8x USB 2.0
Other	2x UART | 12x GPIO | eSPI | SM Bus | I²C	up to 2x Thunderbolt | 2x UART | 2x MiPi-CSI | 12x GPIO | eSPI | SM Bus | I²C | GSPI	2x UART | CAN (opt.) | GPIOs | SPI | LPC | SM Bus | I²C | NVMex4 SSD (optional)
Sound	2x Soundwire | HDA | I2S (opt.)	2x Soundwire | 2x Soundwire or HDA or I2S (opt.)	HDA
Graphics	Intel® UHD Graphics 770 with Xe Graphics Architecture | up to 32 EU	up to Intel® Iris Xe Graphics Architecture | up to 96 Eus	
Video Interface	3x DDI | eDP		3x DDI | LVDS (optional eDP) | VGA (optional)
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control | Hardware Health Monitoring | POST Code redirection		
Embedded BIOS Feature	AMI Aptio® UEFI firmware | 32 Mbyte serial SPI with congatec Embedded BIOS feature | OEM Logo | OEM CMOS default settings | LCD Control | Display Auto Detection | Backlight Control | Flash Update		
Security	Trusted Platform Module (TPM 2.0)		
Power Managment	ACPI 6.0 with battery support		
Operating Systems	Microsoft® Windows 11 | Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Linux | Yocto | Real-Time Systems Hypervisor		
Temperature	Operating Temperature: 0°C to +60°C | Storage: -20°C to +70°C		
Humidity	Operating: 10 .. 90°C r. H. non cond Storage: 5 - 95% r.H non cond.		
Size	120 x 160 mm	120 x 95 mm	95 x 95 mm

intel partner Titanium

conga-TC570

conga-TC570r

conga-HPC/ cTLU

conga-TS570

conga-HPC/ cTLH

Formfactor	COM Express Compact Type 6		COM HPC Client Size A	COM Express Basic Type 6	COM HPC Client Size B
CPU	11th Gen Intel® Core™ / Celeron® processors (Tiger Lake UP3)			11th Gen Intel® Xeon® W / Core™ / Celeron® processors (Tiger Lake H)	
	commercial versions 0 .. +60°C operating temperature				
	Core i7-1185G7E | 4x1.8/4.4 GHz | 12-28W cTDP Core i5-1145G7E | 4x1.5/4.1 GHz | 12-28W cTDP Core i3-1115G4E | 2x2.2/3.9 GHz | 12-28W cTDP Celeron 6305E | 2x1.8 GHz | 15W TDP			Xeon W-11865MLE | 8x1.5/4.5GHz | 25W TDP Xeon W-11555MLE | 6x1.9/4.4GHz | 25W TDP Xeon W-11155MLE | 4x1.8/3.1GHz | 25W TDP Core i7-11850HE | 8x2.6/4.7GHz | 45W/35W cTDP Core i5-11500HE | 6x2.6/4.5GHz | 45W/35W cTDP Core i3-11100HE | 4x2.4/4.4GHz | 45W/35W cTDP Celeron 6600HE | 2x2.6GHz | 35W TDP	
	industrial operating temperature -40°C .. +85°C				
	Core i7-1185GRE | 4x1.8/4.4 GHz | 12-28W cTDP Core i5-1145GRE | 4x1.5/4.1 GHz | 12-28W cTDP Core i3-1115GRE | 2x2.2/3.9 GHz | 12-28W cTDP			Xeon W-11865MRE | 8x2.6/4.7GHz | 45W/35W cTDP Xeon W-11555MRE | 6x2.6/4.5GHz | 45W/35W cTDP Xeon W-11155MRE | 4x2.4/4.4GHz | 45W/35W cTDP	
DRAM	Up to 2x DDR4 SO-DIMM 3200 MT/s 64 GByte total	Up to 32 GByte LPDDR4X 4266MT/s soldered IBECC	Up to 2x DDR4 SO-DIMM 3200 MT/s 64 GByte total IBECC	Up to 3x DDR4 ECC SO-DIMM 3200 MT/s 96 GByte total	Up to 4x DDR4 ECC SO-DIMM 3200 MT/s 128 GByte total
Chipset	integrated in SOC			RM590E | QM580E | HM570E	
Ethernet	1x 2,5GbE TSN Ethernet		2x 2,5 GbE TSN Ethernet	1x 2.5 GbE TSN Ethernet	2x 2.5 GbE TSN Ethernet
Serial ATA	2x SATA III (6Gb/s)			4x SATA III (6Gb/s)	2x SATA III (6Gb/s)
PCI Express Gen 3.0	4x PCIe Gen4 8x PCIe Gen3			16x PCIe Gen4 8x PCIe Gen3	20x PCIe Gen4 20x PCIe Gen3
USB	4x USB 3.2 Gen2 | 8x USB 2.0		2x USB 4.0 | 2x USB 3.2 Gen2 | 8x USB 2.0	4x USB 3.1 Gen 2 | 8x USB 2.0	2x USB 4.0 | 2x USB 3.2 | 8x USB 2.0
Other	SPI | 2x UART | 8x GPIO		2x SATA III (6Gb/s) | SPI 2x UART | 12x GPIO | 8x MIPI-CSI	SPI | 2x UART | 8x GPIO LPC | I2C	eSPI | 2x UART | 12x GPIO I2C | 4x MIPI-CSI
Mass Storage	-			Optional onboard NVMe SSD up to 1TB capacity	-
Sound	HDA interface		1x I2S | 2x Soundwire	HDA interface	1x I2S | 2x Soundwire
Graphics	Integrated Xe (Gen 12) graphics engine with up to 96 EU (Execution Units) | Supporting 4 independent display units (4x 4k/2x 8K) | Enhanced media (AV1/12b) with up to 2 Vdbox | Next Gen IPU6 with DPHY2.1 | HDMI 2.0/2.1 | DP 1.4			Integrated Xe (Gen 12) graphics engine with up to 32 EU (Execution Units) | Supporting 4 independent display units (4x 4k/2x 8K) | Enhanced media (AV1/12b) with up to 2 VDBox | Next Gen IPU6 (Image Processing Unit) with DPHY2.1 | DP 1.4	
Video Interface	3x DP/DP++ | 1x eDP/LVDS				
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control | Hardware Health Monitoring | POST Code redirection				
Embedded BIOS Feature	AMI Aptio® UEFI firmware | 32 Mbyte serial SPI with congatec Embedded BIOS feature | OEM Logo | OEM CMOS default settings | LCD Control | Display Auto Detection | Backlight Control | Flash Update				
Security	Trusted Platform Module (TPM 2.0)				
Power Management	ACPI 6.0 with battery support				
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Microsoft® Windows IoT 10 Core | Linux | Yocto | RTS Hypervisor				
Temperature	Industrial: Operating Temperature: -40°C to +85°C Storage: -40°C to +85°C Commercial: Operating Temperature: 0°C to +60°C Storage: -20°C to +80°				
Humidity	Operating: 10 .. 90°C r. H. non cond Storage: 5 - 95% r.H non cond.				

PERFORMANCE CLASS

conga-TC370 | conga-JC370 | conga-IC370

Formfactor	COM Express Basic 95 x 95 mm², Type 6	3.5" Juke Board 146 x 102 mm²	Thin Mini-ITX 170 x 170 x 20 mm³
CPU	8th Generation Intel® Core™ Mobile Low Power U-Processors with up to 4 cores ("Whiskey Lake")		
	Intel Core i7-8665UE | 4x1.7/4.40 GHz | L2 cache 8MB | 15W TDP | 12.5W/25W cTDP Intel Core i5-8365UE | 4x1.6/4.10 GHz | L2 cache 6MB | 15W TDP | 12.5W/25W cTDP Intel Core i3-8145UE | 2x 2.2/3.90 GHz | L2 cache 4MB | 15W TDP | 12.5W/25W cTDP Intel Celeron 4305UE | 2x 2.2 GHz | L2 cache 2MB | 15W TDP		
DRAM	Dual channel DDR4 up to 2,400 MT/s | 2x SO-DIMM | max. 2x 32 Gbyte		
Chipset	Integrated Intel® 300 Series		
Ethernet	Intel® Gigabit Ethernet i219LM with AMT 12.0 support	Intel® Gigabit Ethernet i219LM (with AMT support) | Intel® Gigabit Ethernet i225 (with opt. TSN support under Linux)	Intel® Gigabit Ethernet i219LM (with AMT support) | Intel® 2.5 Gigabit Ethernet i225 (with opt. TSN support under Linux)
Serial ATA	3x	1x	2x
PCI Express Gen 3.0	8x	see expansion sockets	
USB 3.1 / 2.0	4x Gen 2 | 8x	3x Gen. 2 | 2x	2x Gen. 2 | 4x
Other	LPC bus (no DMA) | I²C bus (fast mode, 400 kHz, multi-master) | 2x UART		
Mass Storage	optional eMMC 5.1 on board mass storage		
Expanson Sockets		M.2 key M size 2280 M.2 key B size 2242/3042 with microSIM M.2 key E size 2230 miniPCIe full/half-size	PCIe x4 miniPCIe full/half-size M.2 key B size 2242/3042/2280 with microSIM slot M.2 key E size 2230 microSD card
Internal Connectors		SATA/eSATA/SATADOM + power Dual USB 2.0 | Audio (HPout/MIC/LINE/DMIC) RS232/422/485 | 2x RS232 | opt. CAN 8 GPIO | Management I/O (opt. 8 GPIO) I²C/SM Bus | Front panel | DC-In (12-24 V) RTC battery socket | Case open | Fan	2x SATA/eSATA/SATADOM + power 2x USB 2.0 | USB 3.1 Gen. 2 (Key-A) | monitor off Audio (front panel / internal stereo/ SPDIF) 2x RS232/422/485 | 2x RS232 | opt. 2x CAN 2x 8 GPIO | opt. feature connector I²C/SM Bus | Front panel | Case open 2x Fan | DC-In (12-24 V)
External Connectors		DP++ (or opt. HDMI) | USB 3.1 Gen.2 Type C (PD/DP Alt. Mode) | 2x USB 3.1 Gen.2 Type A 2x LAN RJ45 | RS232/422/485	1x DC-In (12-24 V) | 2x USB 3.1 Gen.2 (10 Gbs) 2x DP++ | 2x LAN (1+2.5 Gbit) | 2x USB 2.0 Audio (In/Out)
Sound	Intel® High Definition Audio	High Definition Audio Interface | Realtek Audio Codec	
Graphics	Intel UHD 600 Series		
Video Interface	3x DP / HDMI or DP++ ports | 18/24bit single/dual channel LVDS or eDP | optional VGA interface	DP++ (or opt. HDMI) USB Type C (DP Alt. Mode) LVDS 24bit Dual channel (or opt. eDP) opt. 2nd internal display Backlight (power/control)	2x DP++ | LVDS 24bit Dual / . eDP opt. 2nd internal display Backlight (power/control)
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control | Hardware Health Monitoring | POST Code redirection		
Embedded BIOS Feature	AMI Aptio® 2.X (UEFI) BIOS | SM-BIOS | BIOS Update | Logo Boot | Quiet Boot | HDD Password		
Security	Trusted Platform Module (TPM 2.0)		
Power Management	ACPI compliant with battery support | Suspend to RAM (S3) support | S5 enhanced support | Intel AMT 12.0 support	Power Supply 12-24V | Power Management | ACPI S3/S4/DeepS5 | Wake on time from S5	
Operating Systems	Microsoft® Windows 10 (64bit only) | Microsoft® Windows 10 IoT Enterprise (64bit only) | Linux		
Temperature	Operating: 0 .. 60°C | Storage: -20 .. +70°C		
Humidity	Operating: 10 .. 90°C r. H. non cond Storage: 5 - 95% r.H non cond.		

conga-TS370 | conga-TS175 | conga-TC175 | conga-IC175

Formfactor	COM Express Basic 95 x 125 mm², Type 6		COM Express Compact 95 x 95 mm², Type 6	Thin Mini-ITX 170 x 170 x 20 mm³
CPU	8th Gen. Intel® Core™ | Xeon® processors ("Coffee Lake")	7th Gen. Intel® Core™ | Celeron® processors ("Kaby Lake")		
	Core i7-9850HE | 6x2.7/4.4 GHz | Cache 9MB | 45W TDP Core i7-9850HL | 6x1.9/4.1 GHz | Cache 9MB | 35W TDP Core i3-9100HL | 4x1.6/2.9 GHz | Cache 6MB | 25W TDP Xeon E-2276ME | 6x2.8/4.5 GHz | Cache 12MB | 45W TDP Xeon E-2276ML | 6x2.0/4.2 GHz | Cache 12MB | 35W TDP Xeon E-2254ME | 4x2.6/3.8 GHz | Cache 8MB | 45W TDP Xeon E-2254ML | 4x2.7/4.4 GHz | Cache 8MB | 35W TDP Core i7-8850H | 6x2.6/4.3 GHz | Cache 9MB | 45W TDP Core i5-8400H | 4x2.5/4.2 GHz | Cache 8MB | 45W TDP Core i3-8100H | 4x3.0 GHz | Cache 6MB | 45W TDP Xeon E-2176M | 6x2.7/4.4 GHz | Cache 12MB | 45W TDP Celeron G4932E | 2x1.9 GHz | Cache 2MB | 25W TDP Celeron G4930E | 2x2.4 GHz | Cache 2MB | 35W TDP	Xeon E3-1505MV6 | 4x3.0/4.0 GHz | Cache 8MB | 45/35W TDP Xeon E3-1505LV6 | 4x2.2/3.0 GHz | Cache 8MB | 25W TDP Core i7-7820EQ | 4x3.0/3.7 GHz | Cache 8MB | 45/35W TDP Core i5-7440EQ | 4x2.9/3.6 GHz | Cache 6MB | 45|35W TDP Core i5-7442EQ | 4x2.1/2.9GHz | Cache 6MB | 25W TDP Core i3-7100E | 2x2.9 GHz | Cache 3MB | 35W TDP Core i3-7102E 2x 2.1 GHz | Cache 3MB | 25W TDP	Core i7-7600U | 2x2.8/3.9 GHz | Cache 4MB | 15W TDP | 7.5W/25W cTDP Core i5-7300U | 2x2.6/3.5 GHz | Cache 3MB | 15W TDP | 7.5W/25W cTDP Core i3-7100U | 2x2.4 GHz | Cache 3MB | 15W TDP | 7.5W cTDP Celeron 3965U | 2x2.2 GHz | Cache 2MB | 15W TDP | 10W cTDP	
DRAM	max. 64 GByte DDR4 Intel Xeon with ECC optional	max. 32 GByte DDR4 Intel Xeon and Intel Core with ECC optional	Up to 32 GByte dual channel DDR4 memory	
Chipset	Mobile Intel® PCH-H QM/HM370 CM246 for Intel Xeon Processor	Mobile Intel 100 Series Chipset	Integrated PCH-LP	
Ethernet	Intel® I219LM GbE Phy.			Dual Gbit LAN 1x Intel® i219LM GbE AMT 11 supported | 1x Intel i211
Serial ATA	4x	4x	3x	up to 3x
PCI Express Gen 2.0	8x PCIe Gen. 3.0, 1x 16 (PEG)		8x PCIe Gen. 3.0	PCIe x4 Slot (Gen.3) 1x Full/Half-size Mini PCIe Slot with micro SIM slot
USB 3.0 / 2.0	4x USB 3.1 Gen 2 10 GBs | 8x	4x | 8x	4x | 8x	externally 4x | 4x internally - | 4x
Other I/0	SPI, LPC, SM, 2xSerial, GPIO/SDIO, I²C		MIPI-CSI (Flatfoil), SM, I²C, GPIO/SDIO, 2xSerial, LPC	RS232 internal | 8 Bit GPIO internal | M.2 Type B (2230/2242) | Integrated Sensor Hub
Sound	Digital High Definition Audio Interface with support for multiple audio codecs			Audio In/Out 1x Internal stereo speaker 1x Digital Microphone (SPDIF) 1x Front Panel HD Audio
Graphics	Intel UHD 600 Series	Intel HD 600 Series		
Video Interface	LVDS 2x 24 bit/eDP, VGA 3x DisplayPort/HDMI/DVI		LVDS 2x 24 bit/eDP, VGA 2x DisplayPort/HDMI/DVI	2x DisplayPort++ | 1x LVDS (2x24 bit) / Embedded DisplayPort 1x Backlight (power, control) 1x opt. CEC
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | BIOS Setup | Data Backup | I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control			
Embedded BIOS Feature	AMI-Aptio UEFI BIOS, congatec Embedded BIOS			
Security	TPM 2.0 installed	Optional "Trusted Platform Module" (TPM)		
Power Management	ACPI 4.0 with Battery support			internal/external DC-In (12-24V) 1x opt. battery header for battery manager (SBM3)
Operating Systems	Microsoft® Windows 10 (64bit only) | Microsoft® Windows 10 IoT Enterprise (64bit only) | Linux			
Temperature	Operating: 0 .. +60°C Storage: -20 .. +80°C			
Humidity	Operating: 10 .. 90°C r. H. non cond Storage: 5 .. 95% r.H non cond.			

PERFORMANCE CLASS

AMD EMBEDDED SOLUTIONS Partner Program ELITE

conga-TCV2

conga-TR4 (V Series)

conga-TR4 (R Series)

Formfactor	COM Express® Compact, (95 x 95 mm), Type 6	COM Express® Basic, (95 x 125 mm), Type 6 Connector Layout	
CPU	AMD® Embedded Ryzen V2000 Processors	AMD® Embedded V1000 Processors	AMD® Embedded V1000 Processors
	V2516 | 6 x 2.1/3.95 GHz Cache 3MB | 10/25W TDP V2546 | 6 x 3.0/3.95 GHz Cache 3MB | 35/54W TDP V2718 | 8 x 1.7/4.15 GHz Cache 4MB | 10/25W TDP V2748 | 8 x 2.9/4.25 GHz Cache 4MB | 35/54W TDP	V1807B | 4x3.35/3.75 GHz | Cache 2MB | 11 CU | 35/54W V1756B | 4x3.25/3.6 GHz | Cache 2MB | 8 CU | 35/54W V1605B | 4x2.0/3.6 GHz | Cache 2MB | 8 CU | 12W/25W V1202B | 2x2.5/3.4 GHz | Cache 1MB | 3 CU | 12W/25W V1404I | 4x2.0/3.6 GHz | Cache 2MB | 8 CU | 15W	R1606G | 2x2.6/3.5 GHz | Cache 1MB | 3 CU | 12/25W R1505G | 2x2.4/3.3 GHz | Cache 1MB | 3 CU | 12/25W
DRAM	max. 64 GByte DDR4 ECC and non-ECC	max. 32 GByte DDR4 with ECC	
Chipset	Integrated in SOC (single-chip)		
Ethernet	2.5GbE with TSN via Intel® i225	Intel GbE Controller i211	
Serial ATA	2x		
PCI EXPRESS® Gen. 3.0 / 2.0	8x | -	4x | 4x	3x | 4x
PEG	1x (x8)		1x (x4)
USB 3.1 | 2.0	2x | 8x	4x | 8x	3x | 8x
Other	I²C bus, SD, SPI, LPC Bus, SM-Bus, 2x UART		
Sound	Digital High Definition Audio Interface with support for multiple audio codecs		
Graphics	Integrated VEGA 7	Radeon™ Vega Graphics Core (GFX9)	
Video Interface	3x DP/HDMI/DP++ | eDP /LVDS	LVDS 2x 24 bit, 3x DisplayPort | HDMI | DVI	LVDS 2x 24 bit, 2x DisplayPort | HDMI | DVI
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | BIOS Setup, Data Backup I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control | Backlight		
Embedded BIOS Feature	AMI-AptioV® UEFI BIOS		
Security	"Trusted Platform Module" (TPM)		
Power Management	ACPI 5.0 with Battery support		
Operating Systems	Microsoft® Windows 10 | 10 IoT Enterprise Linux	Microsoft® Windows 10 | 10 IoT Enterprise Linux | opt. Microsoft® Windows 7	
Temperature	Operating: 0 .. +60°C Storage: -20 .. +80°C	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C (V1404I) Storage: -20 .. +80°C	Operating commercial: 0 .. +60°C Storage: -20 .. +80°C
Humidity	Operating: 10 .. 90% r. H. non cond. | Storage: 5 .. 95% r. H. non cond.		

intel partner Titanium

conga-TS170

conga-TC170

conga-IC170

Formfactor	COM Express® Basic 95 x 125 mm², Type 6	COM Express® Compact 95 x 95 mm², Type 6	Thin Mini-ITX 170 x 170 x 20 mm³
CPU	6th Gen. Intel® Core™ / Celeron® processors ("Skylake")		
	Intel® Xeon® E3-1578LV5 4x 2.0/3.4 GHz, 8MB, 45W Intel® Xeon® E3-1558LV5 4x 1.9/3.3 GHz, 8MB, 45W Intel® Xeon® E3-1515MV5 4x 2.8/3.7 GHz, 8MB, 45W Intel® Xeon® E3-1505MV5 4x 2.8/3.7 GHz, 8MB, 45W Intel® Xeon® E3-1505LV5 4x 2.0/2.8 GHz, 8MB, 25W Intel® Core™ i7-6820EQ 4x 2.8/3.5 GHz, 8MB, 45W Intel® Core™ i7-6822EQ 4x 2.0/2.8 GHz, 8MB, 25W Intel® Core™ i5-6440EQ 4x 2.7/3.7 GHz, 6MB, 45W Intel® Core™ i5-6442EQ 4x 1.9/2.7GHz, 6MB, 25W Intel® Core™ i3-6100E 2x 2.7 GHz, 3MB, 35W Intel® Core™ i3-6102E 2x 1.9 GHz, 3MB, 25W Intel® Celeron® G3900E 2x 2.40 GHz, 2MB, 35W Intel® Celeron® G3902E 2x 1.6 GHz, 2MB, 15W	Intel® Core® i7-6600U 2x 2.6 /3.4 GHz, Cache 4MB, 15W TDP Intel® Core® i5-6300U 2x 2.4/3.0 GHz, Cache 3MB, 15W TDP Intel® Core® i3-6100U 2x 2.3 GHz, Cache 3MB, 15W TDP Intel® Celeron® 3955U 2x 2.0 GHz, Cache 2MB, 15W TDP	
DRAM	max. 32 GByte DDR4 Intel® Xeon® and Intel® Core with E CC optional	Up to 32 Gbyte dual channel DDR4 memory	
Chipset	Mobile Intel 100 Series Chipset	Integrated PCH-LP	
Ethernet	Intel® I219LM GbE Phy		Dual Gbit LAN 1x Intel® i219LM GbE AMT 11 1x Intel i211
Serial ATA	4x	3x	3x
PCI Express	8x PCIe Gen. 3.0, 1x 16 (PEG)	8x PCe Gen. 3.0	PCIe x4 Slot (Gen.3) 1x Full/Half-size Mini PCIe Slot with micro SIM slot
USB	4x 3.0 | 8x 2.0	4x 3.0 | 8x 2.0	externally 4x 3.0 | - internally - | 4x 2.0
Other I/0	SPI, LPC, SM, 2xSerial, GPIO/SDIO, I²C	MIPI-CSI (Flatfoil), SM, I²C, GPIO/SDIO, 2xSerial, LPC	RS232 internal | 8 Bit GPIO internal | M.2 Type B (2230/2242) | Integrated Sensor Hub
Sound	Digital High Definition Audio Interface with support for multiple audio codecs		Audio In/Out 1x Internal stereo speaker 1x Digital Microphone (SPDIF) 1x Front Panel HD Audio
Graphics	Intel® Gen9 HD Graphics		
Video Interface	LVDS 2x 24 bit/eDP, VGA 3x DisplayPort/HDMI/DVI	LVDS 2x 24 bit/eDP, VGA 2x DisplayPort/HDMI/DVI	LVDS 1x 24 bit/eDP, VGA 2x DisplayPort/HDMI/DVI
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | BIOS Setup | Data Backup | I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control		
Embedded BIOS Feature	AMI-Aptio UEFI BIOS, congatec Embedded BIOS		
Security	Optional discrete "Trusted Platform Module" (TPM).		
Power Management	ACPI 4.0 with Battery support		internal/external DC-In (12-24V) 1x opt. battery header for battery manager SBM3
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Microsoft® Windows 8 | Microsoft® Windows Embedded Standard 8 | Microsoft® Windows 7 | Microsoft® Windows Embedded Standard 7 | Linux		
Temperature Range	Operating: 0 .. +60°C Storage: -20 .. +80°C		
Humidity	Operating: 10 .. 90°C r. H. non cond Storage: 5 .. 95% r.H non cond		

LOW POWER CLASS

Energy-Saving Technology

NXP GOLD PARTNER

conga-SMX8-Mini

conga-SMX8-Plus

conga-SMX8

conga-SMX8-X

Formfactor	SMARC 2.1, 82 x 50 mm²			
CPU	**NXP processor with commercial operating temperature 0°C .. +60°C**			
	i.MX 8M Mini Quad 4x Cortex-A53 1.8 GHz + 1x M4F Dual 2x Cortex-A53 1.8 GHz + 1xM4F Solo 1x Cortex-A53 1.8 GHz + 1x M4F	i.MX 8M Plus Quad 4x Cortex-A53 1.8 GHz + 1x M7 NPU up to 2.3 Tops (optional) + GPU	i.MX 8 QuadMax 2x Cortex A72 + 4x A53 + 2x M4F i.MX 8 QuadPlus 1x Cortex A72 + 4x A53 + 2x M4F	i.MX 8X QuadXPlus 4x Cortex-A35 1.2 GHz + 1x M4F DualXPlus 2x Cortex-A35 1.2 GHz + 1x M4F
	NXP processor with industrial operating temperature -40°C .. +85°C			
	i.MX 8M Mini Quad 4x Cortex-A53 1.6 GHz + 1x M4F Dual 2x Cortex-A53 1.6 GHz + 1xM4F Solo 1x Cortex-A53 1.6 GHz + 1x M4F	i.MX 8M Plus Quad 4x Cortex-A53 1.6 GHz + 1x M7 NPU up to 2.3 Tops (optional) + GPU	i.MX 8 QuadMax 2x Cortex A72 + 4x A53 + 2x M4F i.MX 8 QuadPlus 1x Cortex A72 + 4x A53 + 2x M4F	i.MX 8X QuadXPlus 4x Cortex-A35 1.2GHz + 1x M4F DualXPlus 2x Cortex-A35 1.2GHz + 1x M4F
DRAM	max. 4 GByte LPDDR4 3000 MT/s	max. 6 GByte LPDDR4x 4000 MT/s with Inline ECC	max. 8 GByte LPDDR4 3200 MT/s	max. 4 GByte LPDDR4 2400 MT/s
Ethernet	1x 1 Gb	2x 1 Gb with IEEE 1588 (1x TSN)	2x 1 Gb with IEEE 1588	2x 1Gb with IEEE 1588
Serial ATA	-	-	1x	-
PCI Express	1x Gen 2	1x Gen 3	2x Gen 3	1x Gen 3
USB	5x 2.0 (shared with 1x USB OTG)	2x 3.0 / 5x 2.0 (shared with 1x USB OTG)	1x 3.0 / 5x 2.0 (shared with 1x USB OTG)	1x 3.0 / 5x 2.0 (shared with 1x USB OTG)
Other	SDIO | I²C | SPI | UART | GPIO | WiFi/BT module optional	SDIO | 2x I²C | SPI | 4x UART | GPIO | 2x CAN FD | WiFi/BT module optional	SDIO | SPI | 4x UART | GPIO | I²C | 2x CAN FD | WiFi/BT module optional	SDIO | I²C | SPI | ESPI | 4x UART | 2x CAN FD | GPIO | WiFi/BT module optional
Mass Storage	Onboard Solid State Drive eMMC 5.1 up to 128 Gbyte		Onboard Solid State Drive eMMC 5.0 up to 128 Gbyte	Onboard Solid State Drive eMMC 5.1 up to 128 Gbyte
Sound	2x I²S	2x I²S | optional 1x Tensilica® HiFi 4 DSP	1x I²S, optional 1x Tensilica® HiFi 4 DSP	2x I²S, optional 1x Tensilica® HiFi 4 DSP
Graphics	Integrated in SoC | GC NanoUltra 3D GPU | VPU with 1080p h.265 dec/h.264 video enc	Integrated in SoC | GC7000UL 3D | up to 2x Vec4 shaders | GC520L 2D | VPU with up to 1080p h.265/h.264 dec and enc | integrated ISP	Integrated in SOC | up to dual-core GPU GC7000XSVX | up to 16 Vec4 shaders | 4K h.265 dec / 1080p h.264 enc	Integrated in SOC | GT7000Lite 3D GPU | up to 4 Vec4 shaders and 16 execution units | VPU up to 4K h.265 dec / 1080p h.264 enc
Video Interface	1x LVDS (2x 24 bit) | 1x MIPI-DSI | 1x MIPI-CSI | optional DP | 1 simultan display	1x LVDS (2x 24 bit) |1x HDMI 2.0a | 1x MIPI-DSI | up to 2x 4-lane MIPI-CSI | up to 3 simultan displays	2x LVDS (2x 24 bit) | 1x MIPI-DSI | 2x MIPI-CSI | DP | 1x HDMI 2.0a | up to 3 simultan displays	2x LVDS (1x 24 bit) | optinal HDMI 1.3 | 2x MIPI-DSI | 1x MIPI-CSI | up to 2 simultan displays
Boot loader	U-Boot boot loader			
Power Management	NXP Power Management IC (PMIC)			
Operating Systems	Linux, Yocto, Android			
Temperature Range	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C			
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.			

NXP GOLD PARTNER

conga-QMX6

conga-QMX8-Plus

Formfactor	Qseven, 70 x 70 mm²	Qseven, 70 x 70 mm²
CPU	**NXP processor with commercial operating temperature 0°C .. +60°C**	
	i.MX6 Solo, 1GHz i.MX6 Dual Lite, 1GHz i.MX6 Dual , 1GHz i.MX6 Quad, 1GHz	i.MX 8M Plus Quad 4x Cortex-A53 1.8 GHz + 1x M7 NPU up to 2.3 Tops (optional) + GPU
	NXP processor with industrial operating temperature -40°C .. +85°C	
	i.MX6 Solo, 800MHz i.MX6 Dual Lite, 800MHz i.MX6 Dual , 800MHz i.MX6 Quad, 800MHz	i.MX 8M Plus Quad 4x Cortex-A53 1.6 GHz + 1x M7 NPU up to 2.3 Tops (optional) + GPU
DRAM	up to 4 GByte onboard DDR3L memory | 1066 MT/s	max. 6 GByte LPDDR4x 4000 MT/s with Inline ECC
Ethernet	1x 1 Gb	1x 1 Gb with TSN support
Serial ATA	1x (Dual & Quad CPUs)	-
PCI Express	1x Gen 2	1x Gen 3
USB	5x 2.0 (shared with 1x OTG)	2x 3.0 / 3x 2.0 (shared with 1x USB OTG)
Other	SPI | UART | CAN | SDIO | I²C | MIPI-CSI on extra connector	SDIO | I²C | SPI | UART | GPIO | CAN FD
Mass Storage	Onboard Solid State Drive eMMC 5.0 up to 128 Gbyte	Onboard Solid State Drive eMMC 5.1 up to 128 Gbyte
Sound	I²S	I²S | optional 1x Tensilica® HiFi 4 DSP
Graphics	Integrated | VPU | GPU2D | GPU3D | 4 shaders	Integrated in SoC | GC7000UL 3D | up to 2x Vec4 shaders | GC520L 2D | VPU with up to 1080p h.265/h.264 dec and enc | integrated ISP
Video Interface	2x LVDS (2x 24 bit) | HDMI	1x LVDS (2x 24 bit) |1x HDMI 2.0a | 1x MIPI-DSI | 2x 4-lane MIPI-CSI on optional FFC | up to 3 simultan displays
Boot loader	U-Boot boot loader	
Power Management	NXP Power Management IC (PMIC)	
Operating Systems	Linux, Yocto, Android	
Temperature Range	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C	
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.	

LOW POWER CLASS

conga-PA7

conga-SA7

	conga-PA7	conga-SA7
Formfactor	Pico-ITX, 72 x 100 mm²	SMARC 2.1, 82 x 50 mm²
CPU	Intel Atom® x6000E, Intel® Pentium® and Celeron® J Series processors ("Elkhart Lake")	
	embedded and commercial versions 0 .. +60°C operating temperature	
	Intel® Celeron® J6413 | 10W | 4x 1.8 - 3.0 GHz | 16 EU | PC Client Intel® Pentium® J6426 | 10W | 4x 2.0 - 3.0 GHz | 32 EU | PC Client Intel Atom® x6211E | 6W | 2x 1.3 - 3.0 GHz 16 | EU | Embedded Intel Atom® x6413E | 9W | 4x 1.5 - 3.0 GHz 16 | EU | Embedded Intel Atom® x6425E | 12W | 4x 2.0 - 3.0 GHz 32 | EU Embedded	
	industrial operating temperature -40°C .. +85°C	
	Intel Atom® x6212RE | 6W | 2x 1.2 GHz | 16 EU | Industrial Intel Atom® x6414RE | 9W | 4x 1.5 GHz | 16 EU | Industrial Intel Atom® x6425RE | 12W | 4x 1.9 GHz | 32 EU | Industrial	
DRAM	up to 4 Channels onboard LPDDR4x with up to 4,267 MT/s max. system capacity 16 GB	max. 16GB onboard LPDDR4x with up to 4.267 MT/s
Ethernet	2x LAN Gbit / 100 Mbit / 10 Mbit with TSN support | 2x real-time trigger	2x GbE with TSN support | 2x real-time trigger | M.2 WiFi/BT
SATA	1x M.2 2280 key B (2x PCIe/SATA/USB 2.0)	1x SATA III
PCI Express	1x M.2 2280 key B (2x PCIe/SATA/USB 2.0) 1x M2 2230 key E (1x PCIe, USB 2.0)	4x PCIe Gen. 3
USB	2x 2.0 internal 1x USB-C external 3.1 Gen2 2x Type A external 3.1 Gen 2 1x M.2 2280 key B (2x PCIe/SATA/USB 2.0) 1x M2 2230 key E (1x PCIe, USB 2.0)	2x 3.1G2 (1xOTG) / 6x 2.0 (1xOTG)
Other I/0	Internal: 2x UART (RS242/422/485), Audio (Line, Mic, DMIC), DC 12V, Fan, 3x Feature connector, 2xCAN (opt.) External: DP++, 2x LAN RJ45, 1x USB-C (with PD and DP), 2x USB-A, DC 12V	SDIO, 2xI2C, SPI, eSPI, 4xUART, GPIO, 2xCAN, I2S
Mass Storage		UFS 2.0 onboard flash up to 64 Gbyte (optional up to 512 Gbyte)
Sound	Intel® LPE Audio via I2S	HD Audio Intel® LPE Audio via I2S
Graphics	Intel® UHD Graphics	
Video Interface	DP++, 1x LVDS or eDP (opt.) or MIPI-DSI (opt.)	2x24 Bit LVDS (opt. eDP or MIPI-DSI) 1x DP 1.4 or HDMI 2.0
congatec Board Controller	Multistage watchdog | non-volatile user data storage | manufacturing and board Information | board statistics | fast mode and multi-master I²C bus | power loss control	
Embedded BIOS Feature	AMI Aptio® UEFI firmware | 32 Mbyte serial SPI with congatec Embedded BIOS features | OEM Logo | OEM CMOS Defaults LCD Control | Display Auto Detection | Backlight Control | Flash Update	
Security	TPM 2.0	
Power Management	ACPI 5 .0 compliant | Smart Battery Management	ACPI 5 .0 compliant | Smart Battery Management
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Linux | Android | Yocto | RTS Hypervisor	
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.	

conga-QA7

conga-MA7

conga-TCA7

	conga-QA7	conga-MA7	conga-TCA7
Formfactor	Qseven, 70 x 70 mm²	COM Express Mini, 55 x 84 mm² Type 10 Connector Layout	COM Express Compact, 95 x 95 mm² Type 6 Connector Layout
CPU	Intel Atom® x6000E, Intel® Pentium® and Celeron® J Series processors ("Elkhart Lake")		
	embedded and commercial versions 0 .. +60°C operating temperature		
	Intel® Celeron® J6413 | 10W | 4x 1.8 - 3.0 GHz | 16 EU | PC Client Intel® Pentium® J6426 | 10W | 4x 2.0 - 3.0 GHz | 32 EU | PC Client Intel Atom® x6211E | 6W | 2x 1.3 - 3.0 GHz 16 | EU | Embedded Intel Atom® x6413E | 9W | 4x 1.5 - 3.0 GHz 16 | EU | Embedded Intel Atom® x6425E | 12W | 4x 2.0 - 3.0 GHz 32 | EU Embedded		
	industrial operating temperature -40°C .. +85°C		
	Intel Atom® x6212RE | 6W | 2x 1.2 GHz | 16 EU | Industrial Intel Atom® x6414RE | 9W | 4x 1.5 GHz | 16 EU | Industrial Intel Atom® x6425RE | 12W | 4x 1.9 GHz | 32 EU | Industrial		
DRAM	max. 16GB onboard LPDDR4x with up to 4.267 MT/s		2x SO DIMM socket (dual channel DDR4 3.200 MT/s) | max. 32 GB system capacity
Ethernet	1x GbE with TSN support | real-time trigger		
Serial ATA	2x SATA III		
PCI Express	4x PCIe Gen. 3		6x PCIe Gen. 3
USB	2x 3.1G2 / 8x 2.0		
Other I/0	SDIO, I2C, SM, SPI, UART, CAN, LPC	SDIO, 2xUART, CAN, GPIO, I2C, SM, SPI, SPC	2xUART/CAN, GPIO, I2C, SM, SPI, LPC
Mass Storage	UFS 2.0 onboard flash up to 64 Gbyte (optional up to 512 Gbyte)		
Sound	HD Audio Intel® LPE Audio via I2S		
Graphics	Intel® UHD Graphics		
Video Interface	2x24 Bit LVDS (opt. eDP or MIPI-DSI) 1x DP 1.4 or HDMI 2.0	1x24 Bit LVDS (shared with eDP) 1x DP 1.4 or HDMI 2.0	2x24 Bit LVDS (opt. eDPI) 2x DP 1.4 or HDMI 2.0
congatec Board Controller	Multistage watchdog | non-volatile user data storage | manufacturing and board Information | board statistics | fast mode and multi-master I²C bus | power loss control		
Embedded BIOS Feature	AMI Aptio® UEFI firmware | 32 Mbyte serial SPI with congatec Embedded BIOS feature | OEM Logo | OEM CMOS Defaults | LCD Control | Display Auto Detection | Backlight Control | Flash Update		
Power Management	ACPI 5 .0 compliant | Smart Battery Management		
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Linux | Android | Yocto | RTS Hypervisor		
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.		

LOW POWER CLASS

conga-PA5 | conga-IA5

	conga-PA5	conga-IA5
Formfactor	Pico-ITX, 72 x 100 mm²	Thin Mini-ITX, 170 x 170 x 20 mm³
CPU	5th Gen. Intel® Atom™ / Celeron® / Pentium® processors (“Apollo Lake”)	
	commercial operating temperaure: 0 .. +60°C	
	Intel Atom x7-E3950 | 4x1.6/2.0 GHz | L2 cache 2MB | 12W TDP Intel Atom x5-E3940 | 4x1.6/1.8 GHz | L2 cache 2MB | 9.5W TDP Intel Atom x5-E3930 | 2x1.3/1.8 GHz | L2 cache 1MB | 6.5W TDP Intel Pentium N4200 | 4x1.1/2.5 GHz | L2 cache 2MB | 6W TDP Intel Celeron N3350 | 2x1.1/2.4 GHz | L2 cache 2MB | 6W TDP	
	Intel Celeron J3455 | 4x 1.5/2.3 GHz | L2 cache 2MB | 10W TDP	
	industrial operating temperature: -40°C .. +85°C	
	Intel Atom x7-E3950 | 4x1.6/2.0 GHz | L2 cache 2MB | 12W TDP Intel Atom x5-E3940 | 4x1.6/1.8 GHz | L2 cache 2MB | 9.5W TDP Intel Atom x5-E3930 | 2x1.3/1.8 GHz | L2 cache 1MB | 6.5W TDP	Intel Atom x7-E3950 | 4x1.6/2.0 GHz | L2 cache 2MB | 12W TDP
DRAM	max 8GByte onboard LPDDR4 2400 MT/s	Support for 2x SODIMM Socket, max. 8 GB dual channel up to DDR3L 1866 MT/s
Ethernet	2x Intel® I210 (industrial) /I211 (commercial) Gigabit Ethernet Controller	
Serial ATA	1x SATA III 1x mSATA III	1x SATA III 1x SATA II
PCI Express Gen 2.0	1x miniPCIe shared with mSATA Full Size	1x PCIe x1 Slot | 1x mPCIe Full/Half Size
USB 3.0 / 2.0	externally 2x, 1x USB 3.0 Type C / - internally - / 2x	externally 2x / 2x internally 1x with support for USB 3.0 OTG / 1x
Other I/0	2x RS232/RS422/RS485 1x micro SD slot Feature connector MIPI-CSI 2.0	1x RS232 1x RS232/RS422/RS485 1x micro SD slot MIPI-CSI 2.0 (opt.) 1x M.2 Type B (2242/3042)
Sound	Intel® High Definition Audio	
Graphics	Intel® HD Graphics 500	
Video Interface	1x DisplayPort++ 1x 24-bit Dual Channel LVDS (optional eDP) 1x Backlight (power, control)	2x DisplayPort++ 1x 2-bit Dual Channel LVDS (optional eDP) 1x Backlight (power, control)
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control	
Embedded BIOS Feature	AMI Aptio® UEFI 2.x firmware | OEM Logo | OEM CMOS Defaults | LCD Control Display Auto Detection | Backlight Control | Flash Update	
Security	Optional discrete “Trusted Platform Module” (TPM). It is capable of calculating efficient hash and RSA algorithms with key lengths up to 2,048 bits and includes a real random number generator. Security sensitive applications such as gaming and e commerce will benefit also with improved authentication, integrity and confidence levels.	
Power Management	1x internal DC-In (12V) 1x external DC-In (12V)	1x internal DC-In (12-24V) 1x external DC-In (12-24V) 1x opt. battery header for battery manager (SBM3)
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Linux | Microsoft® Windows IoT Core | Yocto	
Operating Temperature	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C	
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.	

conga-SA5 | conga-QA5 | conga-MA5 | conga-TCA5

	conga-SA5	conga-QA5	conga-MA5	conga-TCA5
Formfactor	SMARC 2.0, 82 x 50 mm²	Qseven, 70 x 70 mm²	COM Express Mini, 55 x 84 mm² Type 10 Connector Layout	COM Express Compact, 95 x 95 mm² Type 6 Connector Layout
CPU	5th Gen. Intel® Atom™ / Celeron® / Pentium® processors (“Apollo Lake”)			
	commercial versions 0 .. +60°C operating temperature			
	Intel Atom x7-E3950 | 4x1.6/2.0 GHz | L2 cache 2MB | 12W TDP Intel Atom x5-E394 | 4x1.6/1.8 GHz | L2 cache 2MB | 9.5W TDP Intel Atom x5-E3930 | 2x1.3/1.8 GHz | L2 cache 1MB | 6.5W TDP Intel Pentium N4200 | 4x1.1/2.5 GHz | L2 cache 2MB | 6W TDP Intel Celeron N3350 | 2x1.1/2.4 GHz | L2 cache 2MB | 6W TDP			Intel Pentium N4200 | 4x1.1/2.5 GHz | L2 cache 2MB | 6W TDP Intel Celeron N3350 | 2x1.1/2.4 GHz | L2 cache 2MB | 6W TDP Intel Celeron N3350 | 2x1.1/2.4 GHz | L2 cache 1MB | 6W TDP
	Intel Celeron J3455 | 4x1.5/2.3 GHz | L2 cache 2MB | 10W TDP			
	industrial operating temperature -40°C .. +85°C			
	Intel Atom x7-E3950 | 4x1.6/2.0 GHz | L2 cache 2MB | 12W TDP Intel Atom x5-E3940 | 4x1.6/1.8 GHz | L2 cache 2MB | 9.5W TDP Intel Atom x5-E3930 | 2x1.3/1.8 GHz | L2 cache 1MB | 6.5W TDP			
DRAM	max 8GByte onboard LPDDR4 2400 MT/s	max 8GByte onboard DDR3L 1866 MT/s		
Chipset	Integrated in SoC			
Ethernet	2x Intel® I210 (industrial) /I211 (commercial) GBE SDP support for real time trigger	Intel® I210 (industrial) /I211 (commercial) GBE		
Serial ATA	1x	2x	2x	2x
PCI Express Gen 2.0	4x	3x	4x	5x
USB 3.0 / 2.0	2x | 4x	1x | 5x	2x | 6x	4x | 8x
Other I/0	SDIO, SPI, I²C, UART, 2x MIPI-CSI, WiFi/Bluetooth (optional)	SDIO, SPI, I²C, LPC, UART, MIPI-CSI		
Mass Storage	eMMC 5.0 onboard flash up to 64 Gbyte			opt. eMMC 5.0 onboard flash
Sound	Intel® High Definition Audio			
Graphics	Intel® HD Graphics Gen. 9			
Video Interface	LVDS 2x 24 | HDMI | DisplayPort			LVDS 2x 24 | 2x DisplayPort or HDMi | 1x eDP 1.3 (optional)
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control			
Embedded BIOS Feature	AMI Aptio® UEFI 2.x firmware | OEM Logo | OEM CMOS Defaults | LCD Control | Display Auto Detection | Backlight Control | Flash Update			
Security	Optional discrete “Trusted Platform Module” (TPM) and includes a real random number generator. Security sensitive applications such as gaming and e commerce will benefit also with improved authentication, integrity and confidence levels.			
Power Management	ACPI 5.0 compliant, Smart Battery Management			
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows IoT Core | Microsoft® Windows IoT Enterprise | Linux | Yocto			
Temperature	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C			
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.			

LOW POWER CLASS

conga-QA3 | conga-QA3E | conga-MA3E | conga-MA3

Formfactor	Qseven, 70 x 70 mm²	Qseven, 70 x 70 mm²	COM Express Mini, 55 x 84 mm² Type 10 Connector Layout	COM Express Mini, 55 x 84 mm² Type 10 Connector Layout
CPU	3rd Gen. Intel® Atom™ / Celeron® processors (“Bay Trail”)			
	commercial versions 0 .. +60°C operating temperature			
	Atom E3845 | 4x1.91 GHz | L2 cache 2MB | 10W TDP			
	Atom E3815 | 1x1.46 GHz | L2 cache 512kB | 5W TDP		Atom E3826 | 2x1.46 GHz | L2 1MB | 7W TDP	
	Atom E3827 | 2x1.75 GHz | L2 1MB | 8W TDP Atom E3826 | 2x1.46 GHz | L2 1MB | 7W TDP Atom E3825 | 2x1.33 GHz | L2 1MB | 6W TDP Atom E3805 | 2x1.33 GHz | L2 1MB | 3W TDP Celeron J1900 | 4x2.0 GHz | L2 2MB | 10W TDP Celeron N2930 | 1.83 GHz | L2 2MB | 7.5W TDP Celeron N2807 | 1.58 GHz | L2 1MB | 4.5 TDP			Atom E3827 | 2x1.75 GHz | L2 1MB | 8W TDP Celeron N2930 | 1.83 GHz | L2 2MB | 7.5W TDP Celeron N2807 | 1.58 GHz | L2 1MB | 4.5 TDP
	industrial operating temperature -40°C .. +85°C			
	Atom E3845 4x1.91 GHz | L2 cache 2MB | 10W TDP Atom E3827 | 2x1.75 GHz | L2 1MB | 8W TDP Atom E3825 | 2x1.33 GHz | L2 1MB | 6W TDP Atom E3815 | 1x1.46 GHz | L2 cache 512kB | 5W TDP Atom E3805 | 2x1.33 GHz | L2 1MB | 3W TDP		Atom E3845 | 4x1.91 GHz | L2 2MB | 10W TDP Atom E3827 | 2x1.75 GHz | L2 1MB | 8W TDP	Atom E3815 | 1x1.46 GHz | L2 512kB | 5W TDP
DRAM	max. 8 GByte dual channel DDR3L 1333MT/s	max. 8 GByte onboard ECC DDR3L 1333 MT/s		max. 8 GByte dual channel DDR3L 1333MT/s
Chipset	Integrated in SoC			
Ethernet	Gigabit Ethernet Intel® I210		Intel® I218LM GbE Phy	
Serial ATA	2x	2x	2x	2x
PCI Express Gen 2.0	3x	3x	3x	4x
USB 3.0 / 2.0	1x | 6x	1x | 6x	1x | 7x	1x | 7x
Other I/0	SDIO, GPIO, SPI, LPC, I²C			
Mass Storage	eMMC 5.0 onboard flash up to 64 GByte (optional)			
Sound	Intel® High Definition Audio			
Graphics	Intel® HD Graphics Gen. 7			
Video Interface	LVDS 2x 24 | 1x HDMI/DisplayPort		LVDS 1x 24 bit 1x DisplayPort/HDMI	
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control			
Embedded BIOS Feature	AMI Aptio® UEFI 2.x firmware | OEM Logo | OEM CMOS Defaults | LCD Control | Display Auto Detection | Backlight Control | Flash Update			
Security	LPC interface for TPM on Carrier Board		Optional discrete “Trusted Platform Module” (TPM)	
Power Management	ACPI 5.0 compliant, Smart Battery Management			
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Core | Microsoft® Windows 10 IoT Enterprise | Microsoft® Windows 8 | Microsoft® Windows Embedded Standard 8 | Microsoft® Windows 7 | Microsoft® Windows Embedded Compact 7 | Microsoft® Windows Embedded Standard 7 | Linux | Yocto			
Temperature	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C	Operating commercial: 0 .. +60°C Storage: -40 .. +85°C	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C	
Humidity	Operating: 10 .. 90 % r. H. non cond. | Storage: 5 .. 95 % r. H. non cond.			

conga-TCA3 | conga-PA3

Formfactor	COM Express Compact 95 x 95 mm², Type 6	Pico-ITX, 72 x 100 mm²
CPU	3rd Gen. Intel® Atom™ / Celeron® processors (“Bay Trail”)	
	commercial versions 0 .. +60°C operating temperature	
	Atom E3845 | 4x1.91 GHz | L2 cache 2MB | 10W TDP Atom E3826 | 2x1.46 GHz | L2 cache 1MB | 7W TDP Celeron J1900 | 4x2.0 GHz | L2 cache 2MB | 10W TDP Celeron N2930 | 4x1.83 GHz | L2 cache 2MB | 7.5W TDP	Atom E3845 | 4x1.91 GHz | L2 cache 2MB | 10W TDP Atom E3826 | 2x1.46 GHz | L2 cache 1MB | 7W TDP
	Atom E3827 | 2x1.75 GHz | L2 1MB | 8W Atom E3825 | 2x1.33 GHz | L2 1MB | 6W Atom E3815 | 1x1.46 GHz | L2 512kB | 5W Celeron N2807 | 2x1.58 GHz | L2 1MB | 4.5W	
	industrial operating temperature -40°C .. +85°C	
	Atom E3845 | 4x1.91 GHz | L2 cache 2MB | 10W TDP Atom E3826 | 2x1.46 GHz | L2 cache 1MB | 7W TDP	
	Atom E3827 | 2x1.75 GHz | L2 1MB | 8W Atom E3815 | 1x1.46 GHz | L2 512kB | 5W	
DRAM	Support for 2x SODIMM Socket, max. 8GB dual channel up to DDR3L-1333	max. 4 GByte on board DDR3-1333
Chipset	Integrated in SoC	
Ethernet	Gigabit Ethernet Intel® I210	1x Gbit LAN | Intel i211 (i210 for industrial version)
Serial ATA	2x SATA II	1x SATA II | 1x mSATA II
PCI Express Gen 2.0	5x	2x miniPCIe Half Size, one shared with mSATA
USB 3.0 / 2.0	1x | 8x	2x | 2x (1x Client)
Other I/0	SDIO, GPIO, SPI, LPC, I²C	1x RS-232 1x micro SD slot Feature connector
Mass Storage	eMMC 4.5 onboard flash up to 64 GByte (optional)	
Sound	Intel® High Definition Audio	Audio In/Out (not on industrial variants) SPDIF OUT (not on industrial variants)
Graphics	Intel HD Graphics Generation 8	
Video Interface	LVDS 2x 24 bit 2x DisplayPort/HDMI/DVI	1x 24-bit Dual Channel LVDS / 1x DisplayPort++
congatec Board Controller	Multi Stage Watchdog | non-volatile User Data Storage | Manufacturing and Board Information | Board Statistics | I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control	
Embedded BIOS Feature	AMI Aptio® (UEFI) BIOS | SM-BIOS | BIOS Update | Logo Boot | Quiet Boot | HDD Password	
Security	Optional discrete “Trusted Platform Module” (TPM)	
Power Management	ACPI 5.0 compliant, Smart Battery Management	1x internal DC-In (12V) 1x ext. DC-In (12V)
Operating Systems	Microsoft® Windows 10 | Microsoft® Windows 10 IoT Core | Microsoft® Windows 10 IoT Enterprise | Microsoft® Windows 8 | Microsoft® Windows Embedded Standard 8 | Microsoft® Windows 7 | Microsoft® Windows Embedded Compact 7 | Microsoft® Windows Embedded Standard 7 | Linux | Yocto | WindRiver IDP | Android	
Temperature	Operating commercial: 0 .. +60°C Operating industrial: -40 .. +85°C Storage: -40 .. +85°C	
Humidity	Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.	

COM COOLING SOLUTIONS

The specifications for COM-HPC, COM Express, Qseven and SMARC modules include heatspreader definitions, the mechanical thermal interface. All the heat generated by power consuming components such as chipsets and processors is transferred to the system's cooling via the heatspreader. This can be achieved by either a thermal connection to the casing, a heat pipe or a heat sink.

Active cooling solution

Heatspreader

Passive cooling solution

Heatpipe Adapter

"congatec's smart cooling pipes pave the way for unlimited performance growth for Computer-On-Modules"

High Performance Cooling

The congatec heatspreaders and cooling solutions for the high performance modules are feature heatpipes in order to boost performance and reliability. A copper block is mounted on the chip to absorb heat and to mitigate the effects of thermal peaks. Between the chip and the copper block, a phase-change material is placed to improve the heat transmission. To account for different component heights and manufacturing tolerances, the copper block is spring loaded to apply an optimized pressure to the silicon dye. The copper block and the cooling fins or heat plate are connected by flexible flat heatpipes.

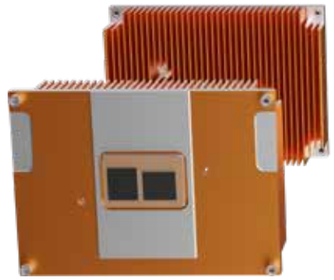
The heat pipe is attached directly to the cooling blocks on the chip and the heatspreader plate. As a result, more heat is transported from the processor environment to the heatspreader, hot spots are cooled more quickly and therefore the processor is optimally cooled.

The heatpipe adapter uses the same principals as described above but transmits the heat from the module directly to standard heat pipes with 8mm diameter. This approach allows for cost optimized, ultra-flat system solutions i.e. 1 U rack units.

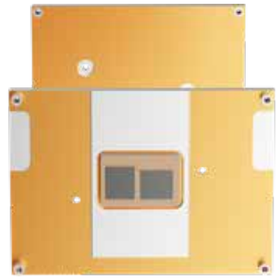
High performance active cooling solution for server class COM Express Type 7 modules

Heat spreader and passive cooling solution for Pico-ITX boards

Passive cooling solution with copper block and phase change material



Heatspreader with copper block and phase change material



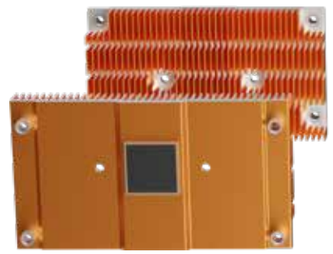
Heatspreader installed to bottom side of a Pico-ITX

The CPU as heat generating component is placed on the bottom side of the Pico-ITX board. This allows for a heat spreader concept for conduction cooled systems. The heat spreader with its installed phase change material and copper block for heat transient buffering is preinstalled with 2 screws to the Pico-ITX board. This combination can be mounted to a metal housing or to any other system cooling device.

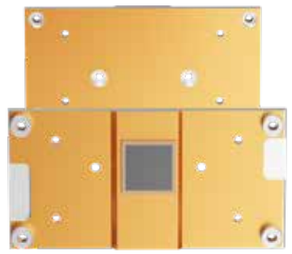
Extreme slim passive cooling for conduction cooling. Installed phase change material for best heat transmission. Solid copper block to handle transient heat and allows for best burst performance. Through holes for easy mounting.

Cooling solutions for SMARC modules

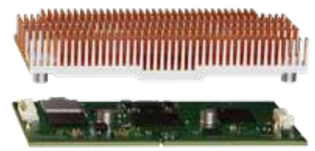
Cooling Solution with fins



Heatspreader



Installation on top of the compute module



Application Example

This example shows a 1U rackmount server with passive cooling. The installed COM-HPC server module in size E transmits the heat, generated by the CPU and the DC/DC converters, to the heatpipe adapter. Six 8mm heatpipes handle the fast and efficient heat transmission from the heatpipe adapter to the cooling fins at the side of the chassis. This concept allows to implement passive cooled servers for rugged environments.

CARRIER BOARDS

Documentation

The schematics and board data of the carrier boards are available for customers on request and can be used as a blueprint to create own customized designs.

Evaluation Carrier Boards

congatec provides evaluation carrier boards for all supported Computer-On-Module standards. This allows for a quick start of new designs. These carrier boards route all the COM signals to standard interface connectors.

- **conga-SEVAL for SMARC**
- **conga-TEVAL for COM Express Type 6**
- **conga-MEVAL for COM Express Type 10**
- **conga-X7EVAL for COM Express Type 7**
- **conga-HPC/EVAL-Server for COM-HPC Server**
- **conga-HPC/EVAL-Client for COM-HPC Client**

Learn more

Application Carrier Boards

come in size-optimized form factors with a special focus on the most common I/Os. These off-the-shelf Carrier Boards serve as platforms for rapid customization and for small or medium sized projects. congatec Application Carrier Boards reduce the time-to-market significantly.

- **conga HPC/uATX for COM-HPC Client**
- **conga-SMC1/SMARC-x86 for SMARC modules**
- **conga-SMC1/SMARC-ARM for ARM based SMARC modules**

Learn more

“The easiest way to implement Computer-On-Modules”

DRAMS – DIRECTLY FROM CONGATEC

Just selecting known DRAM suppliers does not automatically result in a high reliable computing platform. There are many parameters to be checked to find the best solution. At congatec we have a detailed qualification process in place to ensure our memory modules provide highest reliability:

Data Sheet Check

All mechanical and electrical data of a potential new memory module are checked by data sheet. If it qualifies to our requirements we get samples for testing

Mechanical Check

Size, thickness and fitting for all relevant congatec products is tested

Electrical Check

- Windows Installation
- Suspend to RAM (S3) & Restart Cycles
- Test Cycles with 13 different automated test sequences

Reliability Check

The electrical tests are performed 3 to 5 days at full temperature range
- for commercial grade memories –10 °C to +70 °C
- for industrial grade memories –50 °C to +90 °C

Compatibility Check

This test utilizes different operating systems and are performed for all related congatec products

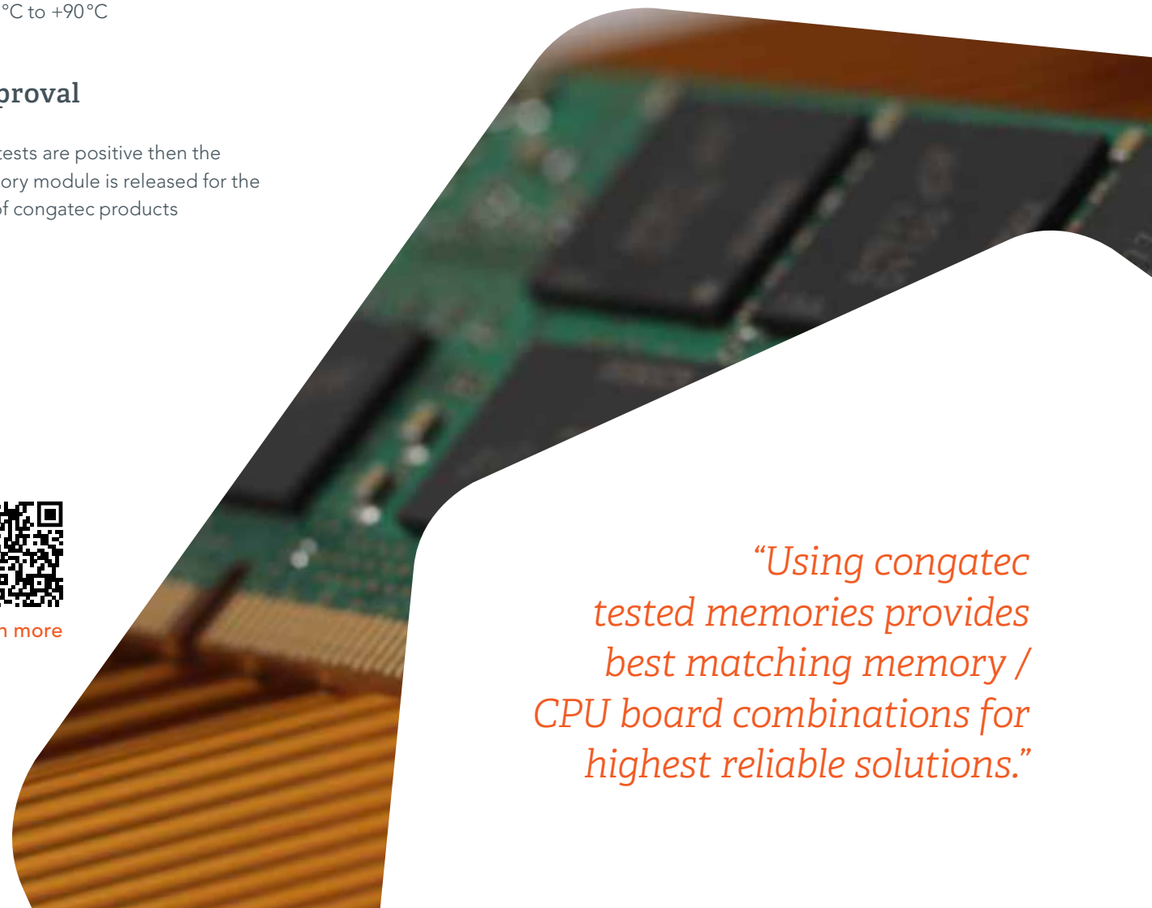
Test Report

A detailed test report documenting all described steps is created

Approval

If all tests are positive then the memory module is released for the use of congatec products

Learn more



“Using congatec tested memories provides best matching memory / CPU board combinations for highest reliable solutions.”

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congatec

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