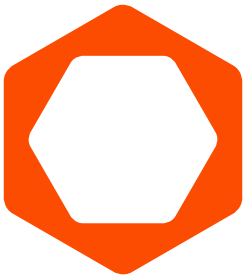
congatec

Product Guide March 2022

International partnerships

We simplify the use of embedded technology.



congatec

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

congatec is a rapidly 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. Backed by controlling shareholder DBAG Fund VIII, a German midmarket fund focusing on growing industrial businesses, congatec has the financing and M&A experience to take advantage of these expanding market opportunities. congatec, founded in 2004 and headquartered in Deggendorf - Germany, is a global market leader in the computer-on-modules segment with an excellent customer base from start-ups to international blue chip companies.

congatec

Embedded in your success.

Pure-Play

World's largest vendor focused on COMs, SBCs and customized designs only.

Roadmap

Most complete roadmap of COM products.

Solid

Stable finance.
Strong growth, no debt and solid profit.

Design-In

Proven superior design-in support. Review of customers designs for compliance, thermal and mechanical design to reduce risk and shorten design cycles.

Innovative

Close partnerships to Intel, AMD and NXP.
Active player in standardization committees SGET and PICMG.

Logistics

Logistics and stability of supply. Strategy for long lead time components. Flexibility through last time buy process. Proven quality for more than 13 years.

Technology Leader

congatec has been driving industry standards since 2005

Technology Partnerships

intel partner Titanium

REAL-TIME SYSTEMS

AMD EMBEDDED SOLUTIONS Partner Program ELITE

WNDRVR

NXP GOLD PARTNER

OSADL Open Source Automation Development Lab eG

PICMG Open Modular Computing Specifications — Executive Member

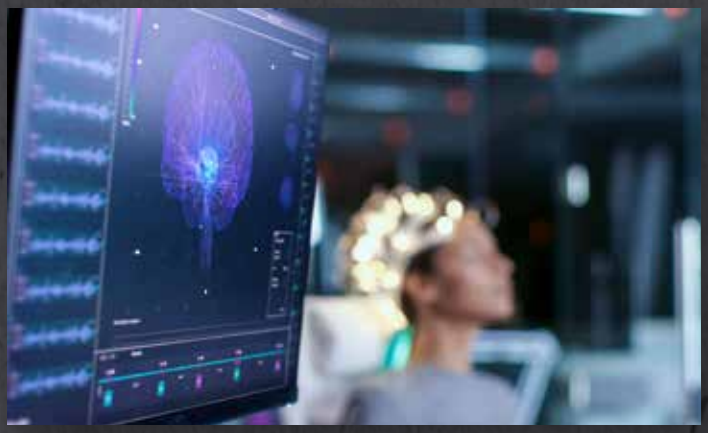
SGeT — Founding Member, Board Member

SMARC module — Specification editor Rev. 2.0, 2.1

COM-HPC — New high performance module standard, Chairman of the PICMG workgroup

COM Express® — Design guide editor Rev. 1.0, Specification editor Rev. 2.0, 2.1, 3.0

QSEVEN — Founding member, Specification & design guide editor








Key Technologies for the Industries.

Real-Time

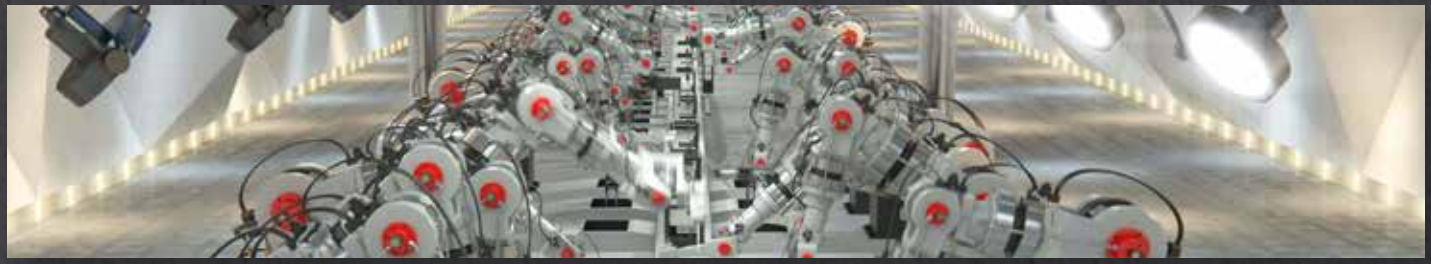
congatec pays special attention to real-time capability during product development. The congatec BIOS/UEFI implementation is of particularly high quality, yielding significantly improved real-time results for OEM customers. By cooperating with OSADL, this real-time capability can be tested over an extremely long time.

Real-Time Hypervisor

Hypervisor support from Real-Time Systems makes the embedded computer technologies from congatec even more attractive. It allows multiple operating systems to be installed on a multicore x86 platform without impacting real-time capability. Each sub-application can be implemented with the appropriate operating system – e.g. real-time data acquisition with VxWorks, the user interface with Windows, and a firewall with Linux. Since Real-Time Systems is a wholly owned subsidiary of congatec, the distances between the two companies are very short, which gives OEMs a time advantage in support cases and promotes interdisciplinary solutions.

Security

By providing numerous BIOS/UEFI security options and Trusted Platform Module (TPM) support, congatec enables customers to implement a high level of security that is optimized for their specific solution requirements.



Real-Time Hypervisor

harness the power of today's multicore processors

Hard Real-Time Performance: Multiple Operating Systems in Perfect Harmony

Combine real-time operating systems like VxWorks , QNX Neutrino or Real-Time Linux , with e.g. Microsoft Windows Operating systems reside simultaneously on an x86 computer while maintaining the hard real-time characteristics of an RTOS

User-definable boot sequence

Reboot any operating system anytime without disturbing the execution of other operating systems

Communication via high performance virtual TCP/IP network and flexible shared memory

Advantages

Reduced system costs and physical size

Hardware consolidation

Hard real-time performance

Maximum flexibility in system functionality

Increased reliability (MTBF) as no additional hardware is required for additional operating system

Works seamlessly with COTS and proprietary operating systems

Proven in thousands of systems worldwide

About the Hypervisor

All operating systems operate completely independent

User defined startup sequence of operating systems

Any operating system can reboot without affecting other operating systems

All operating systems safely separated and protected Standard development tools can be used (supplied by the operating system vendors)

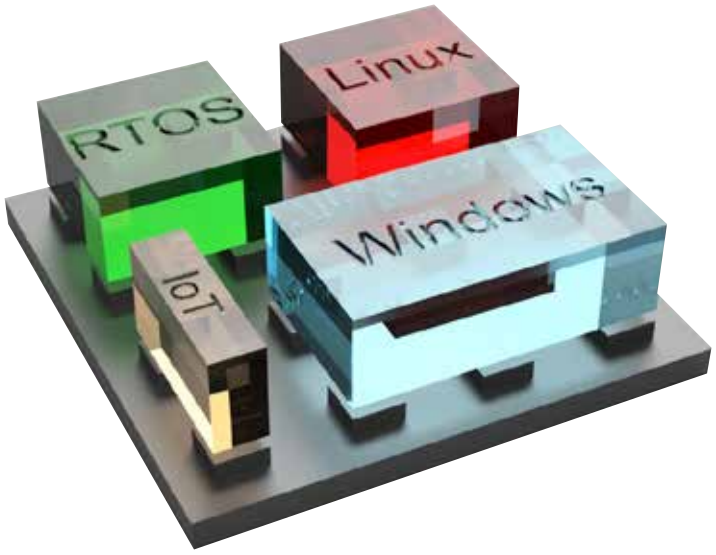
Standard drivers can be used - no special development required

NUMA (Non-Uniform Memory Access) fully supported OS independent drive sharing

Real-Time Hypervisor

harness the power of today's multicore processors

The innovative Real-Time Systems Hypervisor permits multiple operating systems - both real-time (RTOS) and general purpose operating systems (GPOS) like Microsoft™ Windows® or Linux - to run concurrently on multicore x86 processors. By utilizing this powerful and cost-effective software solution, designers achieve increased flexibility in system design and remarkable enhancements to functionality and performance - at the same time reducing overall system cost.



REAL-TIME HYPERVISOR

Single Board Computers
concept & advantages

Industrial

Concept

Ready-to-use embedded platforms -
Reliable and rugged design -
Based on 15+ years of embedded experience -
Long term availability (10+ years) -
Industrial design -

Benefits

- Extended temperature range (up to -40° … +85°C)
- 24/7 operation
- Lowest levels of power consumption
- Rich I/O feature set
- Hard- and software customization

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congatec SBCs

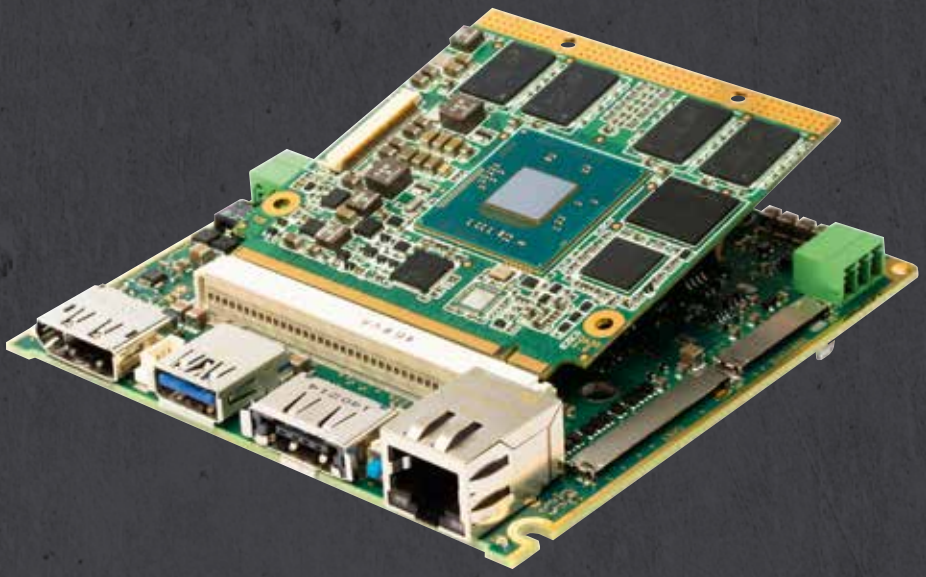
The congatec Single Board Computers offer industrial reliability, embedded features and affordable pricing.

low power embedded mobile CPUs -
Passive and active cooling options -
24/7 operation -
Ceramic capacitors for extended lifetime -
Extended temperature options for harsh environment -
Long term availibility 10+ years -
Customization of hardware and BIOS / UEFI possible -

Industrial SBCs are first choice

when desktop boards reach their limits. The use of Single Board Computers is an easy and fast way for creating industrial computing applications when there are no or just smaller special functionalities required. Customer specific functions can be added by installing cards to the provided extension sockets. Designing with SBCs is faster because there's no need to create customized carrier boards.

Computer-On-Modules
concept & advantages



Concept

CPU module with standard PC core functions -

Carrier board with customer specific function&size -

Logical alternative to a chip-down design effort -

Benefits

- Faster time to market
- Reduced development costs
- Scalable product range
- Allows customer focus on system features
- Faster reaction to market trends
- Second source philosophy
- Minimize inventory cost

Lower Costs

COMs save money. The cost of the development and end product are dramatically reduced when compared with a full custom design. This holds true for the product's entire life-cycle. COMs provide cost advantages from the start.

Lower engineering cost -

Lower product cost -

Lower cost of life cycle management -

Reduced Risk

COMs minimize risk. Basic changes during the design phase, or in the middle of a product's life cycle, are easily managed. Simply plug in the next-generation COM module and continue. COMs allow for easy upgrades.

- Lower design risk
- Lower transition risk

Improved Flexibility

COMs are flexible and can meet all performance requirements. The modules support a wide range of performance levels starting from NXP i.MX6 up to the Intel Xeon processor, as well as future architectures. The COM standards are well established and are already prepared for the future.

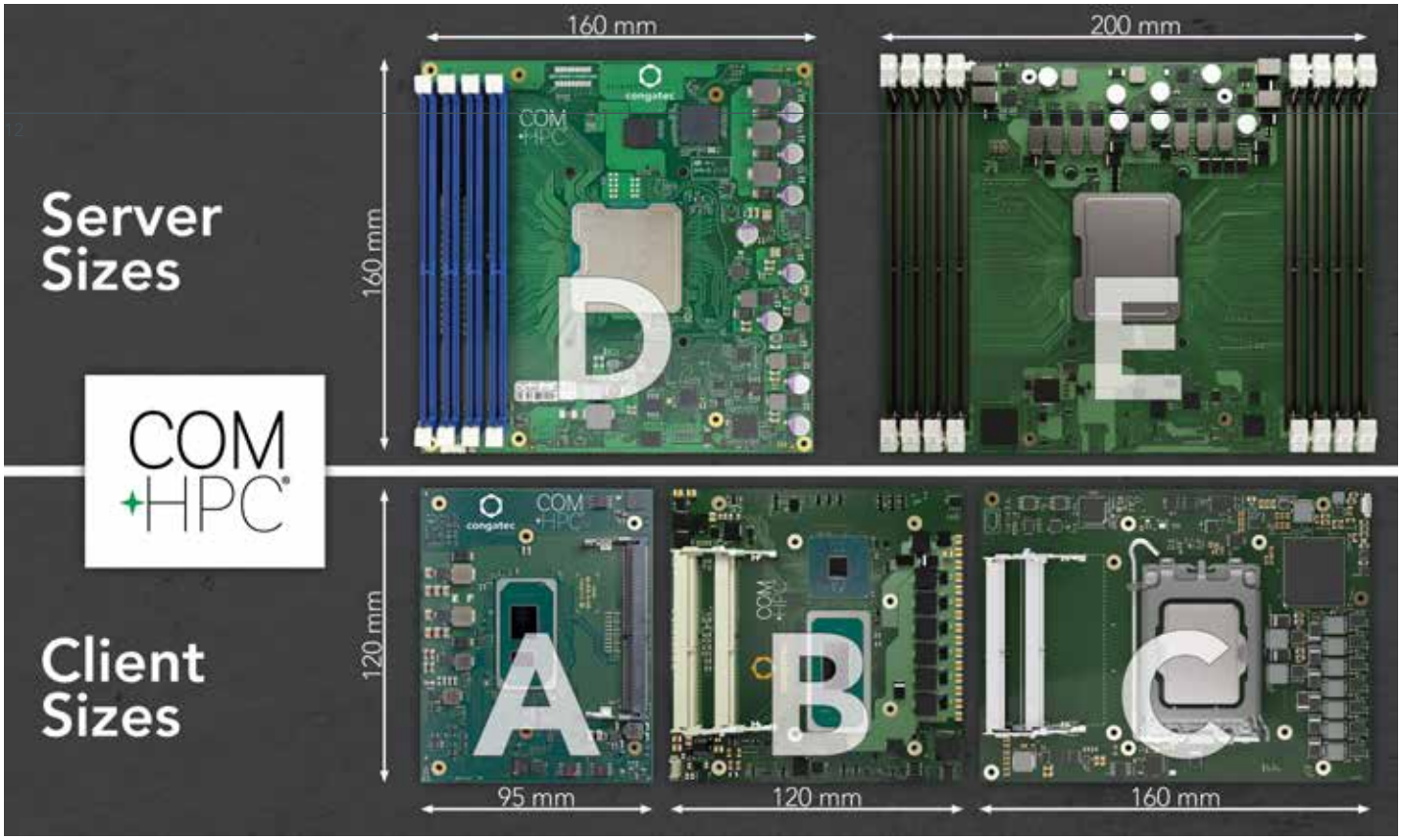
Scalability -

Easy performance and technology upgrades -

Time-To-Market Advantage

COMs put you in a leading position. The use of customized carrier boards reduces necessary engineering effort by separating your design work from the embedded PC technology. Focus on your own core competency.

- Faster time to market
- Faster engineering
- Faster reaction time to market changes

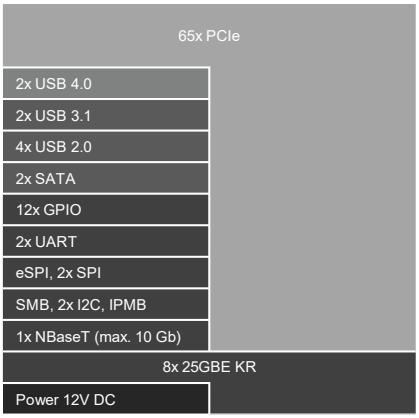


Types

COM-HPC defines two different pinout types. The Server type features up to 65 PCI Express lanes and up to 8x 25Gb Ethernet but has no graphics or audio features. The Client type supports 4 video outputs and multiple audio interfaces i.e. SoundWire and I²S. It's limited to 2x 25Gb Ethernet and 49 PCI Express lanes.

COM HPC Client

COM HPC Server



COM-HPC

COM-HPC is a new Computer-On-Module standard which is currently under development at the PICMG. congatec is one of the founders and chairman of the technical sub-committee. The specification will be released by Feb 2021.

Why a new standard?

Upcoming technologies are PCI Express Gen 4/5, USB 4, 25Gb Ethernet and more require now concepts. Computer-On-Modules has to provide these high speed interfaces to the carrier board. Previous standards are not prepared to support this new levels of data bendwidth. The increased IO performance also requires higher compute performance and larger memory sizes - both at the cost of a higher power consumption.

Out of Band Management

COM-HPC will also define a comprehensive set of features to allow for an easy implementation of out of band management functions. This is required to create efficent edge server implementations.

Connector

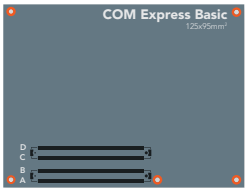
Two 400 pin high speed BGA connectors, which will be available from multiple vendors, provide the right amount of high speed interfaces and the ability to provide up to 300 Watt of power to the module.

Cooling

COM-HPC also defines a heatspreader to allow for easy module change between module vendors.

COM Express®

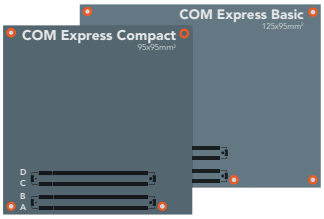
Server Class



COM Express Type 7

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

Performance Class



COM Express Type 6

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

Low Power Class

Type 10

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

Interfaces

COM Express defines 220/440 interconnect pins between the COM Express module and the carrier board. Older modules based on Type 2 supporting legacy interfaces like PCI are still shipping but are not recommended for new designs.

Server-on-Module

The newly introduced Type 7 pinout was generated to enable headless server class applications. It features up to four 10 Gb Ethernet ports, out-of-band management, and up to 32 PCI Express lanes.

Customization

Custom features are generated on a customized carrier board which accepts standard COM Express modules.

Size

COM Express modules are available at three different sizes. The low power Type 10 modules are implemented utilizing the Mini size while Type 6 modules utilize the Compact and Basic form factors. Type 7 modules are available in Basic size.

Thermal Design

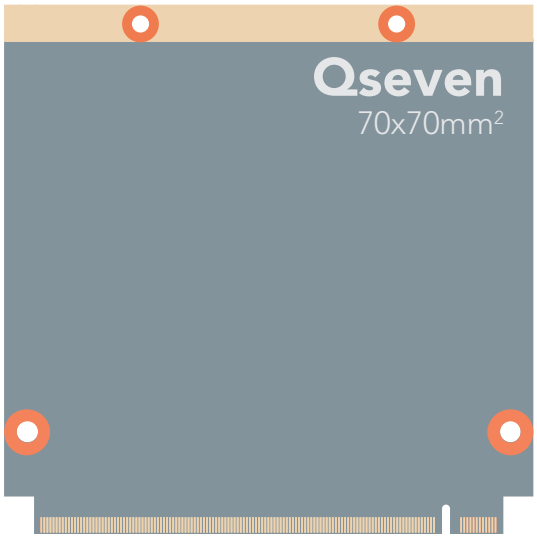
As with Qseven and SMARC, the COM Express definition includes a heatspreader that acts as a thermal interface between the COM Express module and the system's cooling solution. All heat generating components are thermally conducted to the heatspreader in order to avoid hot spots. The high power heatspreaders and cooling solutions utilize congatec's patented high efficient flat heat pipes in order to allow for maximum performance and reliability.

PCI Express

COM Express offers up to 32 PCI Express lanes. This allows the customer to enhance the performance of their embedded application. PCI Express is a low pin count interface with maximum bandwidth per pin. PCI Express 3.0 supports up to 8 GBit/s per lane and direction.

Video Output

Common video outputs for COM Express modules are LVDS for direct flat panel support and up to 3 DDIs (Digital Display Interfaces). Each of the DDI can be switched to TMDS (for DVI or HDMI) or DisplayPort. Type 6 modules also allow for an embedded Displayport. Type 7 modules are designed for headless operation .



Qseven

- 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

Qseven for x86 and ARM processors

Qseven also supports ARM processors for mobile and ultra low power consumption applications. Unlike COM Express it is not limited to x86 processor technology. One carrier board can be equipped with x86 or ARM Qseven modules.

Freedom

Qseven® allows for the use of non x86 processor architectures. It also supports the low power mobile ARM processor architecture. Customers have the freedom to use all kinds of Qseven® modules without the need to change the carrier board.

Mobile Applications

Qseven® is an optimized standard targeting towards low power and mobile / ultra-mobile applications.

Low Power

Qseven® is defined for a maximum power consumption of 12 Watts. It is designed to be operated by single 5 Volt DC power and provides all additional signals for battery management. This simple power requirement allows for small mobile solutions powered by compact two cell batteries.

Connector

Qseven® does not require an expensive board-to-board connector. Instead, it utilizes a very affordable MXM2 card slot with 230 pins in a 0.5 mm configuration.

Legacy Free

Qseven is a legacy free standard focused on high speed serial interfaces such as PCI Express and Serial ATA. Qseven omits support for legacy interfaces like EIDE and PCI, in order to provide ideal support for today's, as well as future, mobile CPUs and chipsets.

Slim Design

When comparing to COM Express Basic, Compact & Mini and SMARC, Qseven enables slimmer mechanical housings.

Compact Size

The module's dimensions are a mere 70 x 70 mm². This means it can be easily integrated into size constricted systems.

SGeT e.V.

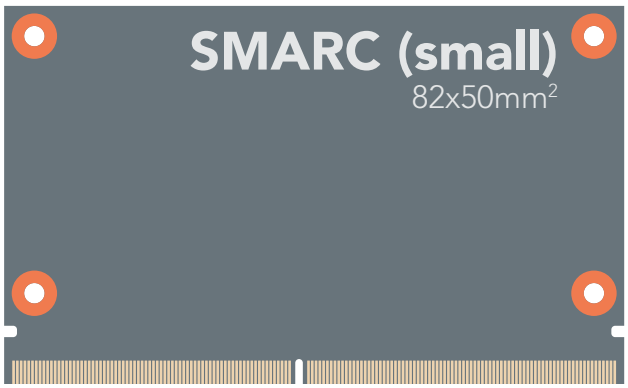
The Qseven Specification is hosted by the SGeT standardization group. congatec is founding member, board member and Qseven development team member of the SGeT.

SMARC module

SMARC 2.1

- 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



The technical highlights of SMARC 2.1

The 314 pins of the SMARC 2.1 connector, which is also used for the MXM 3.0 graphics card standard, provide space for up to four video outputs, underlining SMARC 2.1's particular suitability for multimedia applications.

Connector

SMARC 2.1 utilizes a highly reliable, high speed certified but affordable 314 pin 0.5mm MXM 3 connector.

Extensive video interface options

SMARC 2.1 offers a rich choice of internal and external video interfaces. Two dual-mode DisplayPorts (DP++) are provided for flexible external screen connections via DisplayPort, HDMI or VGA. For internal displays 2x24 Bit LVDS is implemented. Alternative use is defined to support two independent embedded DisplayPort (eDP) or MIPI Display Serial Interface (DSI)

Up to 4 Ethernet interfaces yield greater precision

SMARC 2.1 implements two Gigabit Ethernet ports and the option for further 2 Ethernet ports as an alternative for two upper PCIe lanes. The first two Ethernet ports provide SDPs (Software Defined Pins) to allow for hardware-based IEEE 1588 Precision Time Protocol (PTP)

Wireless

SMARC 2.1 provides a special area on the module that is dedicated to the placement of the miniature RF connectors to allow for wireless interfaces like WLAN and Bluetooth.

Camera interfaces

SMARC 2.1 provides all signals required to support digital cameras. For this purpose, two serial MIPI CSI (Camera Serial Interface) have been implemented on the module connector. Further two MIPI CSI interfaces can be implemented as flat foil connectors on the SMARC 2.1 module.

Low Power

SMARC 2.1 is defined for low power consumption applications only. It can be operated by 3.3V or 5V DC power and provides all additional signals for battery management.

Small Size

The module's dimensions are a mere 82 x 50 mm². This means it can be easily integrated into size constricted systems.

congatec Design Services
for customized designs

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

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

Modification
Special BIOS/UEFI/Firmware features or settings

System Integration
including Tests and Certifications

Manufacturing
Efficient High Quality Production Services

congatec as Outsourcing Partner

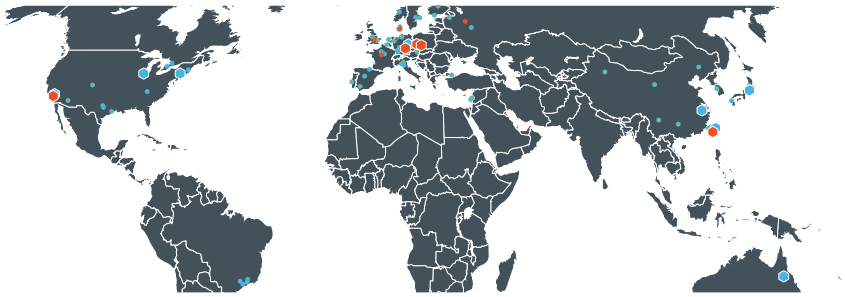
Overview
Mutually define system requirements
Create product concept
Provide detailed design including supply chain
Turnkey delivery for the complete product life cycle

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.

congatec Technical Services
for customized designs

Worldwide Coverage
Engineering and support for standard and customized products in all major regions



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

Reference Schematics
High level starting point for own designs

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

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

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

Layout Review
Detailed check and best practice advice from our specialists

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

Compliance Measurements
Measurement of the signal integrity up to 36 GHz for Rx and Tx signal path

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

Customized Article Handling
Handling of manufacturing and logistics requirements

Support for EMC Measurements
Engineering support to optimize the designs to EMC requirements

MTBF
Reliability calculations based on different standards i.e. Telcordia 3, SN 29500, IEC 61709, ...

Information Sources

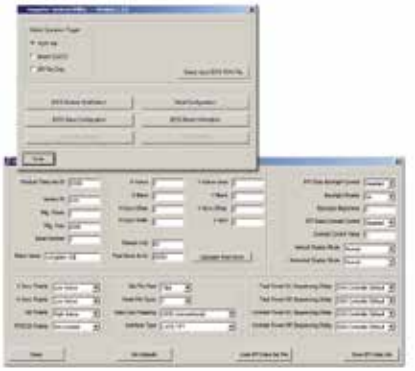
Users Guides
Accurate and detailed product related information

Application & Tech Notes
Specific solutions described in detail i.e. benchmarks, power consumption measurements for different CPUs use cases, and details about the enhanced congatec BIOS features

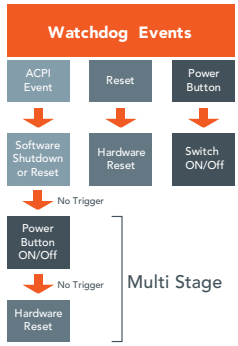
Design Guides
Deep technical "how to" for carrier boards, battery managers, and more

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

congatec embedded BIOS / UEFI



congatec System Utility



Multi Stage Watchdog Timer

Embedded computer users usually require more than the standard functionality of an office computer. congatec has taken these requirements into account when designing BIOS / UEFI functionalities. Based on our large amount of BIOS and UEFI experience, we have implemented the embedded requirements into our powerful congatec BIOS / UEFI 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. This results in higher embedded feature performance and higher overall system reliability.

Information

Board Information

The congatec Board Controller provides a rich data set of manufacturing data and board information: serial number, article number, EAN code, manufacturing and repair date, running time meter, boot counter and more.

Post Code Redirection

The BIOS Port 80h outputs can be forwarded to the I2C bus, the SMBus or to the module UART. This allows for better in-system debugging

Setup

OEM Setup Menu Control

The feature allows customers to hide or show setup nodes and to change the descriptions at the BIOS setup screens.

OEM Verb Table

To initialize carrier board HDA codecs at BIOS level.

UEFI Screenshot Driver

This allows saving the current screen of the BIOS setup to a USB flash drive for professional system documentation.

BIOS Setup Data Backup

The BIOS configuration settings are held in flash memory to allow battery-less applications

OEM BIOS Code

Allows customers to a "do it yourself" integration of their own legacy code into the BIOS BOOT flow. The congatec embedded BIOS calls OEM code at designated schedules.

User Data Memory

congatec modules provide 32 Bytes of non-volatile storage in the EEPROM and a 64 kByte block in the BIOS flash memory. This can be used to store critical and important operating data e.g. system ID, IP address, software key, etc..

Interfaces

Fast Mode I²C Bus
All congatec modules offer a 400 kHz multi-master I²C hardware host controller implementation.

Further congatec BIOS/BC Features
Type based boot device selection, legacy USB support, USB MSD service boot and generic LPC decoding are also supported. Further features include AT mode shutdown configuration (halt, restart), LID & Sleep support and P-State reduction.

Power Loss and Power-up Control
This feature controls the operation mode after AC power loss and normal power on. Turn on, remain off and last state modes are possible.

ACPI Battery Management
The congatec ACPI BIOS and Board Controller are designed to support a CMB (Control Method Battery) sub-system. It's possible to implement customized battery solutions by following the congatec CMB design guide.

Monitoring

Multi Stage Watchdog Timer
All congatec modules are equipped with a multi stage watchdog timer supporting different events such as ACPI event, NMI, hardware reset or power button.

Post Watchdog Timer
This feature allows the monitoring of the BIOS POST process. Starts at system power-up and triggers a hardware reset if adjustable timeout is exceeded.

Hardware Health Monitoring
The congatec BIOS and board controller have routines implemented to monitor critical components implemented. This allows for extensive fan control and standard temperature sensors for CPU, module and voltage monitoring.

Display

Auto-detection
Automatic detection and configuration of an attached flat panel is provided via EPI. EPI is an open standard for easy and direct control of all digital flat panel displays.

Customizable Boot Screen
Dark boot, a customized splash screen or a customer logo during POST are the boot screen options which can be set by the customer directly.

LVDS Backlight Control
The backlight intensity can be set in BIOS setup or modified during run time by using the CGOS API and ACPI methods from the operating systems.

OEM EDID for LVDS Panel
Allows creation of customized EDID data for any LVDS flat panel and add it to the list of predefined types.

Security

Measured Boot with TPM2.0
Full TPM chip support is provided by the BIOS to support features like Bitlocker and Measured Boot.

BIOS write and update protection
Both of these functions are available once the BIOS password has been set in the BIOS Setup. The password is SHA256 encrypted.

Secure Boot with OEM Platform Key
UEFI Secure Boot is about making sure only properly signed and verified images are executed. The congatec embedded BIOS allows to integrate OEM Platform Keys establishing a trust relationship between the platform owner and the platform firmware.

OS Support

32/64 Bit Uniform OS API
The congatec embedded BIOS features are accessible through the uniform APIs EAPI (a PICMG® definition) and the congatec proprietary CGOS API interface.

OEM SMBIOS/DMI Data
Allows customers to update several SMBIOS strings. This allows for DMI table content control by the OEM customer directly. No 3rd party tools are required.

Optimized Power Management
ACPI Power Management and System Configuration are supported by the congatec BIOS / UEFI according to the ACPI specification.

OEM UEFI DXE Driver / Bootloader
This feature allows customers to integrate their own UEFI DXE driver and bootloaders. The built-in CGOS DXE driver allows for CGOS support in these OEM DXE drivers.

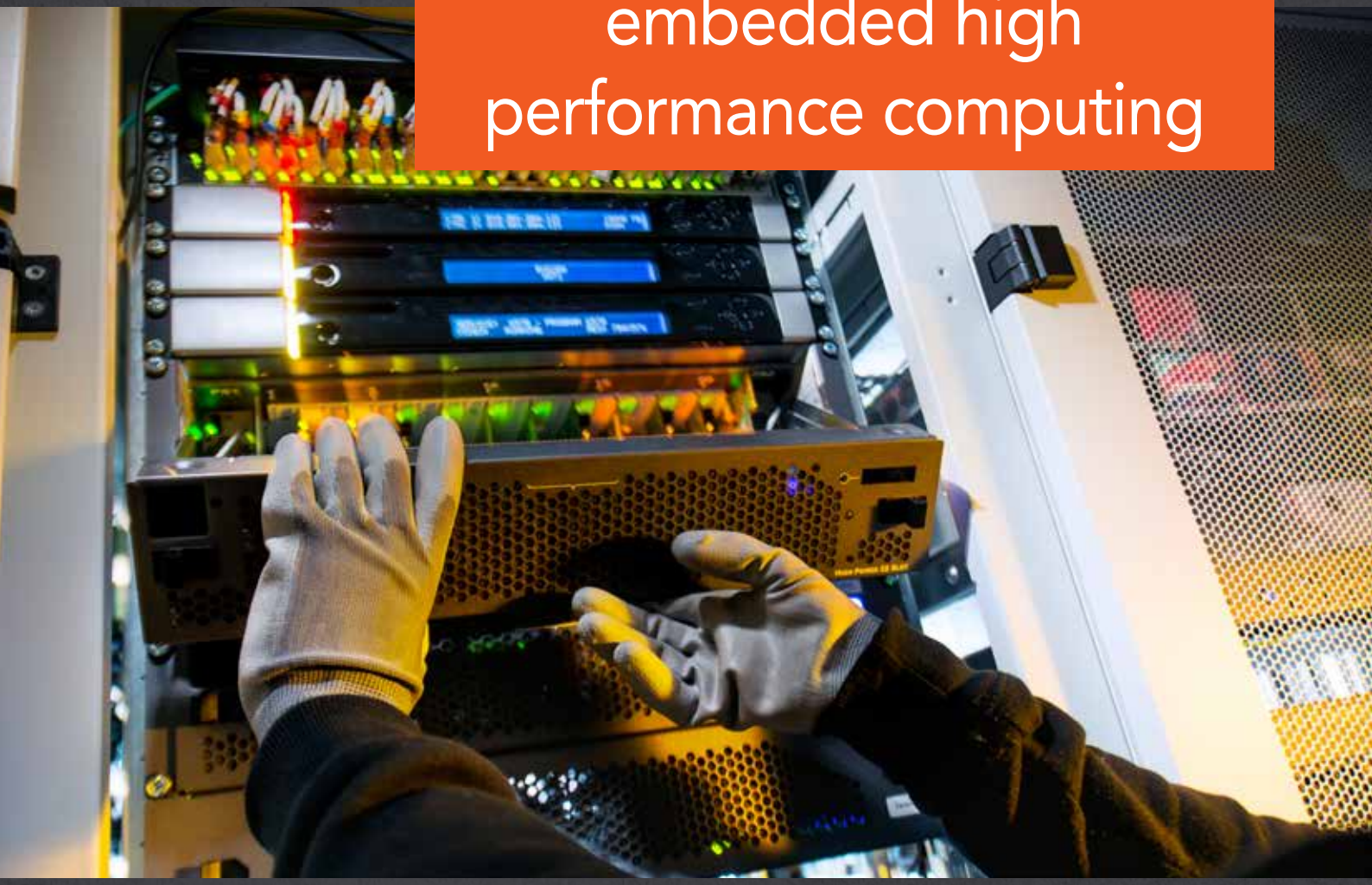
Optimizations for Real-Time Operation
The congatec BIOS includes features to optimize the module behavior for best real-time operation. CPU and GPU clocks can be fixed and turbo modes / C-states can be disabled.

Board Support Packages
congatec offers advanced BSPs, which include the latest tested drivers from silicon vendors and the congatec drivers for accessing the embedded BIOS and module features.

congatec System Utility
All embedded BIOS features are accessible through the use of a congatec utility. This includes all manufacturing and statistical information; e.g. serial number, running hours, boot counter etc. BIOS default settings, bootlogo and flat panel configurations.

Server-On-Modules

embedded high performance computing

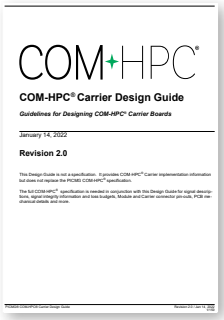


The Server-On-Modules based on the latest Intel® Xeon® processors and the AMD® EPYC® series allow for scalable edge server applications. While the COM Express Type 7 modules extends this established product line the brand new COM-HPC server modules create a new performance class. More and faster I/Os, server class Ethernet, large DRAM sizes and highest computing performance allows to address rugged server applications.

	conga-HPC/sILH			conga-HPC/sILL			conga-B7XI
Formfactor	COM-HPC Server Size E (Size D optional)			COM-HPC Server Size D			COM Express Basic Type 7
CPU	Intel® Xeon® D-2700 processors			Intel® Xeon® D-1700 processors			
	Operating temperature industrial: -40 .. +85°C						
	Intel® Xeon® D-2796TE | 20x Cores | 30MB Cache | 100G Eth | 118W TDP Intel® Xeon® D-2775TE | 16x Cores | 25MB Cache | 100G Eth | 100W TDP Intel® Xeon® D-2752TER | 12x Cores | 20MB Cache | 50G Eth | 77W TDP			Intel® Xeon® D-1746TER | 10x Cores | 100G Eth | 15MB Cache | 67W TDP Intel® Xeon® D-1732TE | 8x Cores | 50G Eth | 15MB Cache | 52W TDP Intel® Xeon® D-1715TER | 4x Cores | 50G Eth | 10MB Cache | 50W TDP			
	Operating temperature commercial: 0 .. +60°C						
	Intel® Xeon® D-2733NT | 8x Cores | 15MB Cache | 50G Eth | 80W TDP Intel® Xeon® D-2712T | 4x Cores |15MB Cache | 50G Eth | 65W TDP			Intel® Xeon® D-1735TR | 8x Cores | 50G Eth | 15MB Cache | 59W TDP Intel® Xeon® D-1712TR | 4x Cores | 50G Eth | 10MB Cache | 40W TDP			
DRAM	8x 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 2400 MT/s 2666 MT/s 2666 MT/s	**Memory Type** RDIMM VLP RDIMM UDIMM (ECC) UDIMM (Non-ECC)	**DIMM Capacity** 8GB - 64GB 8GB - 64GB 8GB - 32GB 4GB - 32GB	**Max. DIMM Speed** 2933 MT/s 2666 MT/s 2666 MT/s 2666 MT/s	
Ethernet	1x 2.5GbE TSN Ethernet 2x 40G | 4x 25G | 8x 10G/2.5G/1G/100M lanes Maximum total bandwidth 100Gb*						1x 2.5GbE TSN Ethernet 4x 10GbE 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						
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 (Optional 160 x 160 mm)			160 x 160 mm			125 x 95 mm

*Depending on CPU

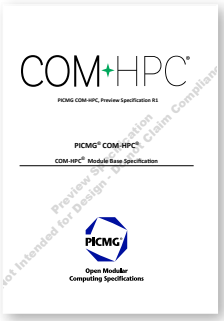
COM-HPC®
further Information



COM-HPC® Carrier Design Guide

This document provides information for designing project specific Carrier Boards for systems using COM-HPC Modules. This document is a design guide and not a specification document. It should be used by together with the COM-HPC Base Specification, with other industry specifications, with silicon and component vendor's documentation and with your COM-HPC Module vendor's product documentation.

Download here



COM-HPC Preview Specification

A preview version of the PICMG COM-HPC hardware specification is available for free

Download here

COM-HPC Webinars

Learn more about the technology, applications and requirements and capalities of this new PICMG standard.

www.congatec.com/com-hpc

	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.		

energy saving technology

NXP GOLD PARTNER

conga-SMX8-Mini

conga-SMX8-Plus

conga-SMX8

conga-SMX8-X

	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.			

Low Power Class

The low power product category features the high performance ARM processors from NXP® and the latest Intel Atom® processors implemented on multiple module sizes i.e. Qseven, SMARC, COM Express Mini / Compact and on Single Board Computer formfactors.

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	max. 2 GByet DDR3 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.	

intel partner Titanium

conga-PA7

Formfactor	Pico-ITX, 72 x 100 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
Ethernet	2x LAN Gbit / 100 Mbit / 10 Mbit with TSN support and Out-Of-Band Management | 2x real-time trigger
SATA	1x M.2 2280 key B (2x PCIe/SATA/USB 2.0)
PCI Express	1x M.2 2280 key B (2x PCIe/SATA/USB 2.0) 1x M2 2230 key E (1x PCIe, USB 2.0)
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)
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
Sound	Intel® LPE Audio via I2S
Graphics	Intel® UHD Graphics
Video Interface	DP++, 1x LVDS or eDP (opt.) or MIPI-DSI (opt.)
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
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.

intel partner Titanium

	conga-SA7	conga-QA7	conga-MA7	conga-TCA7
Formfactor	SMARC 2.1, 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	**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	2x GbE with TSN support and OutOf-Band Management | 2x real-time trigger | M.2 WiFi/BT	1x GbE with TSN support and Out-Of-Band Management | real-time trigger		
Serial ATA	1x SATA III	2x SATA III		
PCI Express	4x Gen. 3			6x Gen. 3
USB	2x 3.1G2 (1xOTG) / 6x 2.0 (1xOTG)	2x 3.1G2 / 8x 2.0		
Other I/0	SDIO, 2xI2C, SPI, eSPI, 4xUART, GPIO, 2xCAN, I2S	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.			

intel partner Titanium

	conga-PA5	conga-IA5
Formfactor	**Pico-ITX, 72 x 100 mm²**	**Thin Mini-ITX, 170 x 170 x 20 mm³**
CPU	**Intel Atom® / Celeron® / Pentium® processors** ("Apollo Lake")	
	commercial operating temperaure: 0 .. +60°C	
	Intel Atom® x7-E3950 | 4x1.6/2.0 GHz | L2 2MB | 12W TDP Intel Atom® x5-E3940 | 4x1.6/1.8 GHz | L2 2MB | 9.5W TDP Intel Atom® x5-E3930 | 2x1.3/1.8 GHz | L2 1MB | 6.5W TDP Intel® Pentium® N4200 | 4x1.1/2.5 GHz | L2 2MB | 6W TDP Intel® Celeron® N3350 | 2x1.1/2.4 GHz | L2 2MB | 6W TDP	
	Intel® Celeron® J3455 | 4x 1.5/2.3 GHz | L2 2MB | 10W TDP	
	industrial operating temperature: -40°C .. +85°C	
	Intel Atom® x7-E3950 | 4x1.6/2.0 GHz | L2 2MB | 12W TDP Intel Atom® x5-E3940 | 4x1.6/1.8 GHz | L2 2MB | 9.5W TDP Intel Atom® x5-E3930 | 2x1.3/1.8 GHz | L2 1MB | 6.5W TDP	Intel Atom® x7-E3950 | 4x1.6/2.0 GHz | L2 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 Series	
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.	

intel partner Titanium

	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 Pinout**	**COM Express Compact, 95 x 95 mm² Type 6 Pinout**
CPU	**Intel Atom® / Celeron® / Pentium® processors** ("Apollo Lake")			
	commercial versions 0 .. +60°C operating temperature			
	Intel Atom® x7-E3950 | 4x1.6/2.0 GHz | L2 2MB | 12W TDP Intel Atom® x5-E394 | 4x1.6/1.8 GHz | L2 2MB | 9.5W TDP Intel Atom® x5-E3930 | 2x1.3/1.8 GHz | L2 1MB | 6.5W TDP Intel® Pentium® N4200 | 4x1.1/2.5 GHz | L2 2MB | 6W TDP Intel® Celeron® N3350 | 2x1.1/2.4 GHz | L2 2MB | 6W TDP			Intel® Pentium® N4200 | 4x1.1/2.5 GHz | L2 2MB | 6W TDP Intel® Celeron® N3350 | 2x1.1/2.4 GHz | L2 MB | 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 2MB | 12W TDP Intel Atom® x5-E3940 | 4x1.6/1.8 GHz | L2 2MB | 9.5W TDP Intel Atom® x5-E3930 | 2x1.3/1.8 GHz | L2 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 500 Series			
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.			

intel partner Titanium




	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	**Intel Atom® / Celeron® processors** ("Bay Trail")			
	commercial versions 0 .. +60°C operating temperature			
	Intel Atom® E3845 | 4x1.91 GHz | L2 cache 2MB | 10W TDP			
	Intel Atom® E3815 | 1x1.46 GHz | L2 cache 512kB | 5W TDP		Intel 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 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 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.			

intel partner Titanium

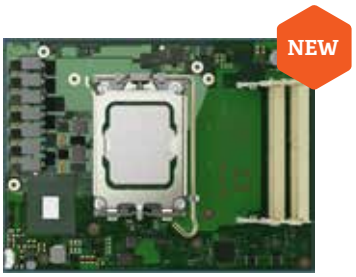
	conga-TCA3	conga-PA3
Formfactor	**COM Express Compact 95 x 95 mm², Type 6**	**Pico-ITX, 72 x 100 mm²**
CPU	**Intel Atom® / Celeron® processors** ("Bay Trail")	
	commercial versions 0 .. +60°C operating temperature	
	Intel Atom® E3845 | 4x1.91 GHz | L2 2MB | 10W TDP Intel Atom® E3826 | 2x1.46 GHz | L2 1MB | 7W TDP Intel® Celeron® J1900 | 4x2.0 GHz | L2 2MB | 10W TDP Intel® Celeron® N2930 | 4x1.83 GHz | L2 2MB | 7.5W TDP	Intel Atom® E3845 | 4x1.91 GHz | L2 2MB | 10W TDP Intel Atom® E3826 | 2x1.46 GHz | L2 cache 1MB | 7W TDP
	Intel Atom® E3827 | 2x1.75 GHz | L2 1MB | 8W Intel Atom® E3825 | 2x1.33 GHz | L2 1MB | 6W Intel Atom® E3815 | 1x1.46 GHz | L2 512kB | 5W Intel® Celeron® N2807 | 2x1.58 GHz | L2 1MB | 4.5W	
	industrial operating temperature -40°C .. +85°C	
	Intel Atom® E3845 | 4x1.91 GHz | L2 2MB | 10W TDP Intel Atom® E3826 | 2x1.46 GHz | L2 1MB | 7W TDP	
	Intel Atom® E3827 | 2x1.75 GHz | L2 1MB | 8W Intel 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.	

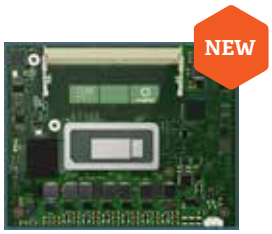
Performance Class

fast and energy efficient

This performance category features multiple Generations of the Intel Core processors and the latest graphic output oriented CPUs from AMD. Multiple form factors i.e. COM Express Compact / Basic and Thin Mini-ITX and JUKE 3.5” boards are supported.

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 2.4/4.6 GHz P-Cores 8x 1.8/3.5 GHz E-Cores 24MB Smart Cache 45W TDP Intel® Core™ i5 126000HE 4x 2.5/4.5 GHz P-Cores 8x 1.8/3.3 E-Cores 18MB Smart Cache 45W TDP Intel® Core™ i3 12300HE 4x 1.9/4.3 GHz P-Cores 4x 1.5/3.3 GHz E-Cores 12MB Smart Cache 45W TDP	
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	2x SATA III (6Gb/s)		
PCI Express Gen 3.0	1x16 PCIe Gen 5 (PEG port) 1x 4 PCIe Gen 4 2x 4 PCIeGen3	Up to x8 PCIe Gen4 2x 4 PCIe Gen4 8x PCIe Gen3 8x PCIe Gen3	8x PCIe Gen4 (PEG Support) 8x 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 | up to 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
Sound	2x Soundwire | HDA | I2S (opt.)	2x Soundwire | 2x Soundwire or HDA or I2S (opt.)	HDA
Graphics	Intel® UHD Graphics 770 with XeArchitecture | up to 32 EU	Intel® Iris XeGraphics 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.				

intel partner Titanium

	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.		

intel partner Titanium

	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.			

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

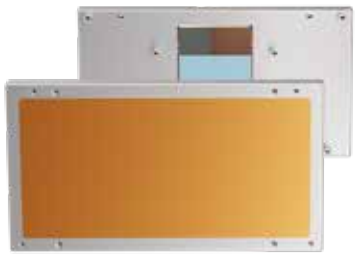
	conga-TS170	conga-TC170	conga-IC170
Formfactor	**COM Express® Basic 95 x 125 mm², Type 6**	**COM Express® Compact 95 x 95 mm², Type 6**	**Thin Mini-ITX 170 x 170 x 20 mm³**
CPU	**6th Gen. Intel® Core™ / Celeron® processors** ("Skylake")		
	Intel® Xeon® E3-1578LV5 4x 2.0/3.4 GHz, 8MB, 45W Intel® Xeon® 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		

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.

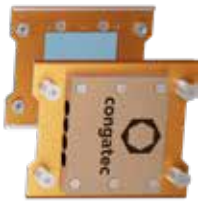
Active cooling solution

Heatspreader



Passive cooling solution

Heatpipe Adapter



congatec's smart cooling pipes pave the way for unlimited performance growth for COM Express 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.

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

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.

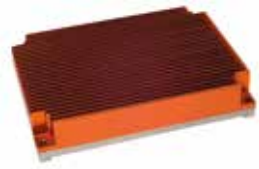
The heatpipe adapter uses the same principals as described above but transmits the heat from the module directly to standard heat pipes with 8mm diameter. This approach allows for cost optimized, ultra-flat system solutions i.e. 1 U rack units.

Heat spreader and passive cooling solution for Pico-ITX boards

Heatspreader with copper block and phase change material

Flat surface for best heat transmission to a chassis

Optimized cooler on top of the heatspreader



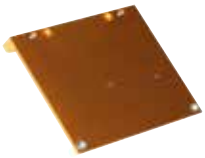
Cooler and heatspreader installed to bottom side of a Pico-ITX

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 Qseven and SMARC

Heatspreader outer side



Heatspreader inner side

Cooling Solution with fins

Heatspreader installation

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.

Starter Kits

all tools in a box to start your rapid development

conga-QKit

This complete kit provides the ability to start evaluating Qseven® modules immediately. Available for ARM (with conga-QMX6) and x86 (with conga-QA5).

conga-SKit

This complete kit provides the ability to start evaluating SMARC modules immediately. Available for ARM (with conga-SMX8) and x86 (with conga-SA5).

conga-MIPI/Skit-ARM

This complete kit provides the ability to connect Basler MIPI cameras to the NXP i.MX8 based SMARC 2.0 module conga-SMX8.

conga-CAM/MIPI Development Kit

This complete kit provides the ability to setup 2 MIPI cameras based on the Pico-ITX single board computer conga-PA5.

Evaluation Carrier

the base design for your own carrier board

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.

Documentation

The schematics and board data of the evaluation carrier boards are freely available and can be used as a blue print to create own customized designs.

conga-SEVAL

Evaluation carrier board for SMARC 2.0 modules.

conga-TEVAL

Evaluation carrier board for COM Express Type 6 modules.

conga-MEVAL

Evaluation carrier board for COM Express Type 10 modules.

conga-X7EVAL

Evaluation carrier board for COM Express Type 7 modules.

conga-HPC/EVAL-Server

Evaluation carrier board for COM-HPC Server Type modules.

conga-HPC/EVAL-Client

Evaluation carrier board for COM-HPC Client Type modules.

Application Carrier Boards

the easiest way to implement Computer-On-Modules

Documentation

The schematics and board data of the Application Carrier Boards are available for customers on request and can be used as a blue print to create own customized designs.

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-MCB/ARM

Small size (95x140mm) carrier board to support all ARM based Qseven modules.

conga-SMC1/SMARC-ARM

Carrier Board for ARM based SMARC 2.0 modules.

conga-STX7/Carrier

Evaluation mini-STX carrier board for COM Express Type 7 modules.

conga-MCB/Qseven

Small size (95x140mm) carrier board to support all x86 based Qseven modules.

conga-SMC1/SMARC-x86

Carrier Board for x86 based SMARC 2.0 modules.

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