



### Product Guide 2017



## congatec presents first computer modules with pre-integrated wireless interfaces

congatec is showcasing its first modules with IoT gateway functionality for the brand-new embedded SMARC 2.0 form factor standard. With flexible wireless connectivity provided directly onboard, they enable developers to integrate any type of WiFi device or Bluetooth sensor.

Another highlight is a complete new generation of IoT building blocks. These include boards and modules with the latest Intel® Atom<sup>™</sup>, Celeron<sup>®</sup> and Pentium<sup>®</sup> (Intel<sup>®</sup> code name "Apollo Lake") low-power processors that congatec is introducing in five form factors. They are available as

#### congatec Product Range





Modules (COM) Qseven, COM Express, SMARC 2.0 SBC Industrial Single Board Computers

Services

We simplify the use of embedded technology.



application-ready Qseven, SMARC 2.0 and COM Express Computer-on-Modules, as well as Pico-ITX and Mini-ITX single board computers.

congatec is further presenting the first COM Express 3.0 Type 7 Server-on-Module for the development of innovative high-performance edge, fog and cloud servers. As an industry first, it offers developers 2x 10 GB Ethernet and up to 16 computing cores on one application-ready module.



### congatec International Partnerships



### **Technology Leader** congatec has been driving industry standards since 2005

		congated		COM - Expre	ss <sup>®</sup>
		Configurat BIOS	ble	Design G	juide
	сом 🔶				
	Express® First Type 2 Module		Founding Member	E N	_
XTX	]	<b>O</b> congatec			<b>O</b> congatec
Founder		Heat Pipe Cooling		_	Battery Manager
5 20	2007	7 2008	2009	20	10 20

#### TECHNOLOGY PARTNERSHIPS



Intel® IoT Alliance Solutions – Associate member

сом 🔶

Express® COM Express® design guide Rev. 1.0 editor COM Express® Rev. 2.0 / 2.1 / 3.0 editor

Intel®

Technology Provider -

Platinum member

Oseven® Founding member Qseven® Specification & design guide editor





**SMARC** SMARC™ Specification editor



SGET e.V. Founding Member SGET e.V. Board Member

W Witekio EMBEDDING SUCCESS Witekio Software Partner



Executive Membe



2005







#### INDUSTRIAL AUTOMATION

Industrial Automation is a conservative Market with strong focus on reliability and long term perspectives. Demanding environments require highest, industry-proof quality and longevity. Standards and scalability enable right sized platform concepts with easy upgrade paths as well as guaranteed future.



ENTERTAINMENT

Entertainment spans from simple Handheld devices to arcade-style high-end gaming machines with high-performance graphics capabilities. The module concept and the industrial single board computers fit perfectly to the industry's demand for unique scalable and application ready platforms. This makes it easy to implement latest platforms with highest performance at lowest cost for development and certification.



MEDICAL

Medical has a unique demand for highest safety and reliability meeting regulatory requirements. Applications range from demanding computing requirements for optical Analysis like CRT, MRT and Ultrasonic to compact, low power mobile diagnostic and supportive equipment. Ultra mobile, low-power, battery-operated devices with highly interactive graphical user interfaces are a rapidly growing emerging segment.



TRANSPORTATION

This applications require highest levels of robustness, reliability and longevity in demanding environment. Applications span from custom automotive equipment to kiosk and signage use for public transportation as well as to freight tracking and delivery control.



ENERGY

The intelligent use of renewable energies is highly dependent on proper process control to ensure maximum efficiency even in a harsh environment. Power distribution control challenges with demand for highest computing performance and reliability.



#### **INTERNET OF THINGS**

A key enabler for new IoT appliances is the right processor technology platform to allow for intelligent connected devices. To achieve lowest R&D costs, the platform need to be standardized. As time to market is an increasingly important competitive factor, simplified development paired with highest data security levels are required.



#### POINT OF SALE (POS)/KIOSK

This dynamic market is powered by the trends to cashless payment and comfortable self-service stations. Applications range from small and mobile payment devices up to full featured, networked information kiosks and vending machines with touch control.

### congatec Simplify Embedded Technology.

### **Product Line Commons** All product lines feature the congatec embedded philosophy

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#### Listening to Customers to Deliver Optimal Solution

congatec delivers advanced engineering services to develop best-in-class, standards based, semi-customized and fully customized hardware and software solutions.



Standard components and operating systems



2 Advanced software and hardware development



Customization and design-in support



Fabless production worldwide



Up to 10 year lifecycle support

#### SBC

- Optimized coolings
- Embedded feature set
- Rugged design
- Low power consumption
- Project support
- Customizable HW&SW



- Design to requirement
- Up to system level

### **COM Advantages** when compared

## to a Full Custom Design



#### Concept

- CPU module with standard PC core functions
- Carrier board with customer specific functions & 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



µQseven

70x40 mm



Qseven

70x70 mm



**SMARC** 

82x50 mm



COM Express Mini

84x55 mm





COM Express Compact 95x95 mm

COM Express Basic 125x95 mm

### **Qseven** LVDS 2x24 / eDP 2x MIPI CSI (Flatfoil 2x SATA 8x USB 2.0 / 2x USB 3.0 2x SER / CAN Powe

#### **COM Express Type 10**

LVDS 1x24

2x SAT

8x USB 2.0 / 2

8x GPIO /

2x SER /

SPI&I

#### COM Express Type 6

ernet	Gigabit Ether
	LPC
e	
	HDA
/ eDP	
	LVDS / eDI
	ExpressCar
Ą	4x SATA
CUSB 3.0	8x USB 2.0
SDIO	8x GPIO / SE
CAN	2x SER / CA
C	SPI & I2C
	Power

#### 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 a cost advantage from the very 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

#### **SMARC 2.0**

2x Gigabit Ethernet
eSPI
4x PCIe
HDA / 2x 12S
LVDS 2x24 / eDP / MIPI DSI
2x MIPI CSI
HDMI & DP++
1x SATA
6x USB 2.0 / 2x USB 3.0
12x GPIO / SDIO
4x SER / CAN
SPI / I2C
Power

#### **COM Express Type 7**



#### **Improved Flexibility**

COMs are flexible and can meet all performance requirements. The modules support a wide range of performance levels starting from Freescale 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

- Performance upgrades are easy
- Technology upgrades are easy

#### 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. Use COMs in your design and you can stay focused on your own core competency.
- Faster time to market
- Faster engineering
- Faster reaction time to market changes



# **COM Express**<sup>®</sup> the most scalable

COM Express° is a PICMG° standard that defines a Computer-On-Module, or COM, packaged as a super component. The defined interfaces provide a smooth transition path from legacy interfaces to modern differential signals. This includes DisplayPort, PCI Express°, USB 3.0 and Serial ATA. congatec is specification editor for the most recent revision 3.0 of this PICMG° standard. This version includes the new Type 7 definition which extends the use for COM Express modules to server class applications.



2x SATA 4x USB 2.0 8x GPIO / SDIO 2x SER / CAN SPI & I2C Power Power Gigabit Ether LPC HDA LVDS / eDP ExpressCard 4x SATA 8x USB 2.0 8x GPIO / SD 2x SER / CAN SPI & I2C Power

#### Interfaces

COM Express<sup>®</sup> defines up to 440 interconnect pins between the COM Express<sup>®</sup> module and the carrier board. Older interfaces such as PCI, parallel ATA are supported with legacy type 2 modules. Type 6 modules feature additional PCI Express<sup>®</sup> 2.0/3.0 Lanes, USB 3.0, 3 DisplayPort/HDMI outputs and no longer multiplexes the PEG port with graphic signals.

#### Server-on-Module

The newly introduced Type 7 pinout was generated to enable server class applications. It features up to four 10 Gb Ethernet ports and up to 32 PCI Express lanes. It's designed for headless operation. It does not support any video or audio interfaces but allows for out-of-band management.

#### Customization

COM Express<sup>®</sup> is a legacy free standard. Legacy interfaces or custom features are generated on a customized carrier board.

#### Size

COM Express® describes four different sizes. The low power Type 10 modules are implemented utilizing the Mini (84x55mm<sup>2</sup>) size. Type 6 modules are implemented for Compact (95x95 mm<sup>2</sup>) and Basic (95x125 mm<sup>2</sup>) form factors while Type 7 modules are currently only available in Basic size. The Extended (155x110 mm<sup>2</sup>) size is a potential extension for Type 7 modules.

#### GPIO

 $\mathsf{COM}\xspace{1mu}\xspace{1m$ 

nce Cl	ass	Low Power Class
COM Expres	is Basic •	COM Express Mini
ess Type 6	5	Type 10
net	4x USB 3.0	Gigabit Ethernet
8x	PCle	4x PCle
		HDA
	PEG x16	LVDS 1x24 / eDP
		DDI
		2x SATA
		8x USB 2.0 / 2x USB 3.0
0	3x DDI	8x GPIO / SDIO
		2x SER / CAN
		SPI & I2C
	Power	Power

#### **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 heatspreaders and cooling solutions for the high power modules utilize congatec's patented high efficient flat heat pipes in order to allow for maximum performance and highest reliability.

#### PCI Express®

COM Express<sup>®</sup> offers up to 32 PCI Express<sup>®</sup> lanes. This allows the customer to equip their embedded PC application with the next generation of PC performance. PCI Express<sup>®</sup> is a low pin count interface with maximum bandwidth per pin. PCI Express<sup>®</sup> is defined for a maximum bandwidth of 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. New Type 6 modules will also allow for an embedded Displayport. This eDP interface will be multiplexed with the LVDS A channel. Type 7 modules are designed for headless use and does not support direct video outputs.



### **Oseven** the mobile COM definition

Targeting next generation ultra mobile embedded processors built using latest mobile chip technologies, the Qseven° format complements the low power and small size of these processors. By exploiting the small form factor of the industry's latest processors, the Qseven° format offers high performance computing power, delivered in a module measuring only 70 x 70 mm<sup>2</sup> or 40x70 mm<sup>2</sup>.



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**

Oseven<sup>®</sup> 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

Oseven® 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<sup>®</sup> is a legacy free standard focused on high speed serial interfaces such as PCI Express<sup>®</sup> and Serial ATA. Qseven<sup>®</sup> 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.

#### **Compact Size**

The module's dimensions are a mere  $70 \times 70 \text{ mm}^2$ . This means it can be easily integrated into size constricted systems. The even smaller  $\mu$ Qseven definition is  $40 \times 70 \text{ mm}^2$  only but is limited to support ultra-low power CPUs only.

#### Slim Design

When comparing to COM Express<sup>®</sup> Basic, Compact & Mini and SMARC, Qseven<sup>®</sup> enables slimmer mechanical housings.

#### SGeT e.V.

The Qseven® Specification is hosted by the SGeT standardization group founded in 2012. congatec is founding member, board member and Qseven® development team member of the SGeT.



# **SMARC 2.0** for multimedia and IoT

SMARC 2.0 is perfectly positioned between the two well-established module standards Qseven and COM Express. Compared with the Qseven standard, which allows low-cost entry into the world of computer modules, SMARC offers more interfaces – especially more video and camera ports and a second Ethernet connection to support IoT applications.





#### The technical highlights of SMARC 2.0

The 314 pins of the SMARC 2.0 connector, which is also used for the MXM 3.0 graphics card standard, provide space for up to four video outputs, underlining SMARC 2.0's particular suitability for multimedia applications.

#### Connector

SMARC 2.0 utilizes a highly reliable, high speed certified but affordable 314 pin 0.5mm MXM 3 connector.

#### Extensive video interface options

SMARC 2.0 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)

#### Two Ethernet interfaces yield greater precision

SMARC 2.0 implements two Gigabit Ethernet ports, which is a particular advantage for IoT or Industry 4.0 applications. Both Ethernet ports provide SDPs (Software Defined Pins) to allow for hardware-based IEEE 1588 Precision Time Protocol (PTP)

#### Wireless

SMARC 2.0 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 2.0 provides all signals required to support digital cameras. For this purpose, two serial MIPI CSI (Camera Serial Interface) have been implemented.

#### Low Power

SMARC 2.0 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.

#### **Backwards Compatible**

SMARC 2.0 is not compatible with the previous definition SMARC 1.1. The feature set was completely updated, one third of the pin definitions have been changed.

#### Small Size

The module's dimensions are a mere 82x50mm<sup>2</sup>. This means it can be easily integrated into size constricted systems.

#### SGeT e.V.

The SMARC ("Smart Mobility ARChitecture") Specification is hosted by the SGeT standardization group founded in 2012. congatec is founding member, board member and SMARC specification editor of the SGeT.



### Single Board Computers industrial

The use of Single Board Computers is an easy and fast way for creating industrial computing applications when there is no or just smaller special functionalities are required. Designing with SBCs can be faster because there's no need to create a customized carrier board.

Thin-Mini ITX 170 x 170 mm<sup>2</sup> at a maximum height of 20 mm





When desktop boards reach their limits then the congatec SBCs are first choice.

#### Thin Mini-ITX and Pico-ITX

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

On top of the rich interface selection the congatec SBCs offer many extra features to allow for industrial use:

- Lowest power consumption utilizing embedded mobile CPUs
- Passive and active cooling options
- 24/7 operation
- Ceramic capacitors for extended lifetime
- Extended temperature options for harsh environment
- Long term availability 7+ years
- Customization of hardware and BIOS/UEFI possible
- Extreme flat solutions based on the Thin Mini-ITX standard with max. height of 20mm
- Expandable by PCI Express, Mini PCI Express and M.2 slots
- Enhanced security features with optional TPM chip



Pico-ITX 100 x 72 mm<sup>2</sup> for most compact industrial SBC solutions





#### Concept

- SBCs are a ready-to-use embedded platforms
- Reliable and rugged designs
- Based on 12+ years of embedded experience

#### Benefits

- Long term availability (7+ years)
- Industrial design
- Extended temperature range (up to -40° ... +85°C)
- 24/7 operation
- Lowest levels of power consumption
- Rich I/O feature set
- Certified accessories
- Hard- and software customization

### **EDM Services** for embedded designs





Customized Qseven carrier board design

supporting multiple wireless interfaces.

#### congatec's EDMS Support

congatec's EDMS 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.

- Services for Customized Designs
- Modules Customization
- Custom Designed Carrier Boards
- Customized Single Board Computers
- Full Custom Hardware Designs
- Standard and Special Cooling Solutions
- Housing Design and Manufacturing
- System Integration with Certifications
- Efficient High Quality Production Services

Custom designed IoT gateway supporting multiple wireless standards. Scalable desgin based on Qseven Computer-On-Module.

#### congatec as Outsourcing Partner

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

congatec supports customer developments throughout the entire product life cycles with EDM (Embedded Design & Manufacturing) services.

Customers benefit from congatec's rich experience as a manufacturer of high quality computer modules with synergistic effects leading to reduced development time and costs.

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

Passive cooled digital signage controller with Intel<sup>®</sup> Core<sup>™</sup> i7 processor performance





#### **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** Internet-of-Things Platforms

This new, highly flexible IoT gateway hardware platform is application-ready and easily customizable for rapid field deployment. OEMs benefit from an instantly available pre-configured, pre-certified IoT gateway that can easily connect a wide range of heterogeneous sensors, actors and systems to cloud-based services.

### Internet of Things congatec IoT Gateway Platforms

#### Reliability

congatec COMs, SBCs and EDM Solutions are the core technology to enable intelligent IoT devices.

#### Manageability

Enable common provisioning frameworks, remote upgrades and web based configuration.

#### INTERNE CLOUD BIG DATA GATEWAY LAN Device Sensor Hub Sensor I Reliability Connectivity Managed

#### Application Ready IoT Platform

- Highly flexible, application ready IoT gateway hardware platform.
- Easily customizable for rapid field deployment.
- Extreme levels of flexibility in terms of processing performance and software integration.
- Hosts up to 8 wireless antennas.
- Connectivity based on 3 mini PCI Express and 6 internal USB slots
- Perfect base for customized system designs.





#### Security

Protect devices, applications and data for trust and control.

#### Connectivity

Pre-integrated connected capabilities enable rich network options based on wired, wireless, cellular and short-range technology

#### IoT Starter Kits Validated Hard/Software

- Validated combination of selected hardware and software components.
- All required accessories.
- Enables quick IoT prototypes with high data security levels.



### 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 some of the embedded features, such as system monitoring or the I<sup>2</sup>C bus, from the x86 core architecture. This results in higher embedded feature performance and higher overall system reliability.

#### **Optimized Power Management**

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

#### 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. It can either assert a single event and/or any combination of these events.

#### 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 (256 ms to 4.5 h) is exceeded.

#### **Post Code Redirection**

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

#### Fast Mode I<sup>2</sup>C Bus

The I<sup>2</sup>C Bus is a simple serial bus interface often used for sensors, converters or data storage in embedded applications. All congatec modules offer a 400 kHz multi-master I<sup>2</sup>C Bus.

#### 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. This feature does not require an installed CMOS battery.

#### **BIOS Setup Data Backup**

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

#### **Board Information**

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

#### **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. User Data Memory can be locked to prevent manipulation.

#### 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. The flexible sensor/actuator assignment allows for easy customization.

#### **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 with maximum interchangeability

#### 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. External DACs and potentiometers are supported. Connections are supported utilizing the I2C or PWM signals.

#### 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.

#### **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. Possible options are before/after OpROM scan, before setup and before boot. This can be used to initialize custom carrier board hardware, to add PCI/PCIe OpROMs and boot loaders, to provide Windows SLP string and SLIC tables for OEM activation, to create own HDA codec verb tables or for other OEM customizations.

#### **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 UEFI based CGOS support.

#### **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.

#### OEM BIOS Default Settings

The congatec embedded BIOS allows users to create custom OEM default settings. These settings can be stored as defaults in the flash memory.

#### **OEM Setup Menu Control**

The feature allows customers to hide or show setup nodes and to change the descriptions at the BIOS setup screens. Full control for the setup screens is provided to the OEM.

#### **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. The resulting .png files can be used for professional system documentation.

#### **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.

#### BIOS write and update protection

Both of these functions are available once the BIOS Password has been set in the BIOS Setup. When enabled, the BIOS cannot be updated or modified, BIOS write and update protection can be temporarily disabled with the congatec System Utility (CGUTIL) (requires BIOS Password). The congatec BIOS password is SHA256 encrypted.

#### **ACPI Battery Management**

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

#### congatec System Utility

All embedded BIOS features are accessible through the use of a congatec Windows tool. This includes all manufacturing and statistical information; e.g. serial number, running hours, boot counter etc. BIOS default settings, bootlogo and flat panel configurations can easily be programmed using this flexible and powerful tool.

#### 32/64 Bit Uniform OS API

The congatec embedded BIOS Features are accessible through the uniform APIs EAPI (a PICMG® definition) and CGOS.

#### **Board Support Packages**

congatec offers advanced BSPs, which include both the latest tested drivers from silicon vendors and the congatec specific drivers for accessing all of our additional embedded BIOS and module features.

#### **Optimizations for Real Time Operation**

The congatec BIOS/UEFI includes features to optimize the module behavior for best real time operation. CPU and GPU clocks can be fixed and turbo modes / SpeedStep / C-states can be disabled. Further options include PCIe/DMI ASPM disable, Passive cooling disable and support for exclusive IRQ.

#### 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. Some platforms also allows to drive any IRQ over SERIRQ at the GPIO interface.



### **Server-On-Modules** embedded high speed

The new power saving Intel® Xeon processors allow for server performance on COM Express modules. The newly introduced type 7 pinout enables further server class features i.e. 10 Gigabit Ethernet and extra PCI Express lanes.





conga-TS175

COM Express® Basic 95 x 125 mm², Type 6		
l® Core™ processors ("Skylake")	7 <sup>th</sup> Gen. Intel <sup>®</sup> Core™ processors ("Kabylake")	
rature commercial: 0 +60°C		
78LV5 4x 2.0/3.4 GHz, 45W TDP 58LV5 4x 1.9/3.3 GHz, 45W TDP 15MV5 4x 2.8/3.7 GHz, 45W TDP 05MV5 4x 2.8/3.7 GHz, 45W TDP 05LV5 4x 2.0/2.8 GHz, 25W TDP	Xeon® E3-1505MV6 4x 3.0/4.0 GHz, 45/35W Xeon® E3-1505LV6 4x 2.2/3.0 GHz, 25W TDP	
	-	
	-	
2 SO-DIMM sockets for up to 32 GByte 2133 I	DDR4 memory modules MT/s ECC or non-ECC	
egrated in SoC		
1x (	GBE	
4x		
24x		
4x .	/ 8x	
LPC, SPI, I <sup>2</sup>	C, 2xUART	
igital High Definition Audio Interface	with support for multiple audio codecs	
Intel <sup>®</sup> Gen9	HD Graphics	
LVDS 2x 24 bit, VGA 3x DisplayPort/HDMI/DVI		
turing and Board Information   Board Statistics   BIOS Setup   Data Backup   z, multi-master)   Power Loss Control		
DS, congatec Embedded BIOS		
rusted Platform Module" (TPM).		
ACPI 4.0 compliant, Smart Battery Management		
Vindows 10   Microsoft® Windows soft® Windows 8   Microsoft® abedded Standard 8   Microsoft® Microsoft® Windows Embedded Microsoft® Windows Embedded Linux	Microsoft® Windows 10 (64bit only) Microsoft® Windows 10 IoT Enterprise (64bit only) Linux	



### Low Power Class energy saving technology

The low power product category features multiple Generations of the Intel<sup>®</sup> Atom<sup>TM</sup> processors, G and Gx Series CPUs from AMD and high end ARM processors from NXP. Multiple form factors i.e. Qseven,  $\mu$ Qseven, SMARC 2.0, COM Express Mini / Compact and the SBC form factors Pico-ITX and Thin Mini-ITX.





	conga-SA5	conga-QA5
ormfactor	SMARC Specification 2.0 82 x 50 mm <sup>2</sup>	Qseven, 70 x 70 mm <sup>2</sup>
		5 <sup>th</sup> Gen. Intel <sup>®</sup> Atom™ / Celero
		Intel <sup>®</sup> Atom <sup>™</sup> x7-E3950 4x
	commercial / industrial	commercial / industrial
		Intel <sup>®</sup> Atom <sup>™</sup> x5-E3940 4x 1
	commercial / industrial	commercial / industrial
PU		Intel® Atom™ x5-E3930 2x 1
	commercial / industrial	commercial / industrial
		Intel <sup>®</sup> Pentium <sup>®</sup> N4200 4x
	commercial	commercial
		Intel® Celeron® N3350 2x
	commercial	commercial
RAM	max 8GByte onboard LPDDR4 with 2400 MT/s	
hipset		Inte
thernet	2x Intel® I210 (industrial) /I211 (commercial) GBE SDP support for real time trigger	
erial ATA	1x	2x
CI EXPRESS®	4x	3x
SB 3.0/2.0	2x / 4x	1x / 5x
ther I/O	SDIO, SPI, I <sup>2</sup> C, UART, 2x MIPI-CSI, WiFi/Bluetooth (optional)	
ass Storage	eMMC 5.0 onboard flash up to128 G	
ound	Intel® Hig	
raphics		Intel <sup>®</sup> H
ideo terface	LVDS 2x 24   HDMI   DisplayPo	
ongatec oard ontroller	Multi Stage Watchdog   non-volatile User Data Storage   Manufac multi-master	
mbedded IOS Feature	AMI Aptio® UEFI 2.x firmware   OEM Logo   OEM CMOS Defaults	
ecurity	LPC interface for TPM on Carrier Board	
ower anagement	ACPI 5.0 compliant	
perating /stems	Mid	crosoft® Windows 10   Microsoft® Win
emperature	Operating commercial: 0 +6 Stora	
umidity	Operating: 10 90 % r. H. nor	

	conga-MA5	conga-TCA5	
	COM Express Mini, 55 x 84 mm² Type 10 Connector Layout	COM Express Compact, 95 x 95 mm² Type 6 Connector Layout	
<sup>®</sup> /	Pentium® processors ("Apollo Lake")		
.6/2	2.0 GHz, L2 cache 2MB,12W TDP		
	commercial / industrial	industrial	
.6/1	.8 GHz, L2 cache 2MB, 9.5W TDP		
	commercial / industrial	industrial	
.3/1	.8 GHz, L2 cache 1MB, 6.5W TDP		
	commercial / industrial	industrial	
1.1/2	2.5 GHz, L2 cache 2MB, 6W TDP		
	commercial	commercial	
.1/2	2.4 GHz, L2 cache 1MB, 6W TDP		
	commercial	commercial	
m	nax 8GByte onboard DDR3L with 1866 M	IT/s	
grat	ed in SoC		
In	tel® I210 (industrial) /I211 (commercial) (	GBE	
	2x	2x	
	4x	5x	
	2x / 6x	4x / 8x	
	SDIO, SPI, I <sup>2</sup> C, LPC, UART, MIPI		
Byte	2	opt. eMMC 5.0 onboard flash	
h D	efinition Audio		
) Gr	aphics Gen. 9		
t		LVDS 2x 24   2x DisplayPort or HDMI	
uring and Board Information   Board Statistics   I²C bus (fast mode, 400 kHz,   Power Loss Control			
LCD Control   Display Auto Detection   Backlight Control   Flash Update			
Optional discrete "Trusted Platform Module" (TPM)			
Smart Battery Management			
dows IoT Core   Linux   Android 6.0   VxWorks 7.0			
°C Operating industrial: -40 +85°C ge: -40 +85°C			
_			

cond. Storage: 5 .. 95 % r. H. non cond.

Humidity





		memory mi-mi-Metholish	
	conga-PA5	conga-IA5	
Formfactor	Pico-ITX 72 x 100 mm <sup>2</sup>	Thin Mini-ITX 170 x 170 x 20 mm³	
	5 <sup>th</sup> Gen. Intel <sup>®</sup> Atom™ / Celeron <sup>®</sup> /	Pentium® processors ("Apollo Lake")	
	Intel <sup>®</sup> Atom <sup>™</sup> x7-E3950 4x 1.6/.	2.0 GHz, L2 cache 2MB, 12W TDP	
	commercial / industrial	commercial / industrial	
	Intel <sup>®</sup> Atom <sup>™</sup> x5-E3940 4x 1.6/′	I.8 GHz, L2 cache 2MB, 9.5W TDP	
	commercial / industrial	commercial	
CPU	Intel® Atom <sup>™</sup> x5-E3930 2x 1.3/ <sup>−</sup>	I.8 GHz, L2 cache 1MB, 6.5W TDP	
	commercial / industrial	commercial	
	Intel® Pentium® N4200 4x 1.1/	2.5 GHz, L2 cache 2MB, 6W TDP	
	commercial	commercial	
	Intel® Celeron® N3350 2x 1.1/	2.4 GHz, L2 cache 1MB, 6W TDP	
	commercial	commercial	
DRAM	max 8GByte onboard LPDDR4 with 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 (Cor	nmercial) Gigabit Ethernet Controller	
Serial ATA	1x SATA III 1x mSATA III	1x SATA III 1x mSATA III	
PCI EXPRESS®	1x miniPCle shared with mSATA Full Size	1x PCIe x1 Slot   1x mPCIe Full/Half Size shard with mSATA	
USB 3.0/2.0	internally - / 2x externally 2x /- 1x USB 3.0 Type C	externally 2x / 2x internally 1x / 1x USB 3.0 OTG	
Other I/O	2x RS232/RS422/RS485 1x micro SD slot Feature connector MIPI-CSI 2.0	2x RS232/RS422/RS485 1x micro SD slot MIPI-CSI 2.0 1x M.2 Type B (2230/2242)	
Sound	Intel <sup>®</sup> High Definition Audio		
Graphics	Intel® HD Graphics Gen. 9		
Video Interface	1x 24-bit Dual Channel LVDS 1x DiplayPort++ 1x Backlight (Power, control)	2x DisplayPort++ 1x LVDS (2x24 bit) 1x Embedded DisplayPort 1x Backlight (Power, control)	
congatec Board Controller	Multi Stage Watchdog   non-volatile User Data Storage I²C bus (fast mode, 400 kHz, m		
Embedded BIOS Feature	AMI Aptio® UEFI 2.x firmwar   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 ext. 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® Windo	ws IoT Core   Linux   Android 6.0   VxWorks 7.0	
Temperature	Operating commercial: 0 +60°C Storage:	Operating industrial: -40 +85°C -40 +85°C	

Operating: 10 .. 90 % r. H. non cond. Storage: 5 .. 95 % r. H. non cond.





	conga-QA4	conga-MA4
Formfactor	Oseven 70 x 70 mm²	COM Express Mini, 55 x 84 mr Type 10 Connector Layout
СРИ		4th Gen Intel <sup>®</sup> Intel <sup>®</sup> Pentium <sup>®</sup> N3710, 4x 1 Intel <sup>®</sup> Celeron <sup>®</sup> N3160, 4x 1 Intel <sup>®</sup> Celeron <sup>®</sup> N3060, 2x 1 Intel <sup>®</sup> Celeron <sup>®</sup> N3010, 2x 1. Intel <sup>®</sup> Atom <sup>™</sup> X5-E8000, 4x 1
DRAM		max. 8 GByte dual channel DDR3L 1600 N
Chipset		
Ethernet		Gigabit Ethernet Intel® I2
Serial ATA	2x	2x
PCI EXPRESS®	3x	4x
USB 3.0/2.0	8x USB 2.0 or 1x USB 3.0 and 5x USB 2.0	2x / 8x
Other I/O		SDIO, GPIO, SPI, LPC, I <sup>2</sup>
Mass Storage	eMMC 4.5.1 onboard flash up to 64GByte (optional)	
Sound		Intel <sup>®</sup> High Definition Auc
Graphics		Enhanced Ir
Video Interface	LVDS 2x 24 HDMI DisplayPort	LVDS 1x 24 bit 2x DisplayPort/HDMI
congatec Board Controller	Multi Stage Watchdog   non-volatile User Data Storage   Manufactur	
Embedded BIOS Feature	AMI Aptio® UEFI 2.x firmware   OEM Logo   OEM CMOS Default Backlight Control   Flash Up	
Security		LPC interface for TPM on Carrie
Power Management	AC	PI 5.0 compliant, Smart Battery N
Operating Systems	Microsoft® Windows 10   Micros	oft® Windows 10 IoT   Microsoft® Microsoft® Window
Temperature		Operating: 0 .
Humidity		Operating: 10 90 % r. H.





#### conga-TCA4

m²

COM Express Compact, 95 x 95 mm<sup>2</sup> Type 6 Connector Layout

Thin Mini-ITX 170 x 170 x 20 mm<sup>3</sup>

conga-IA4

l<sup>®</sup> Atom<sup>™</sup> Processors ("Braswell") 1.6/2.56 GHz, 2 M Cache, 6W TDP/4W SDP, 16 GFX EUs, 700 MHz GFX 1.6/2.24 GHz, 2 M Cache, 6W TDP/4W SDP, 12 GFX EUs, 640 MHz GFX 1.6/2.48 GHz, 1 M Cache, 6W TDP/4W SDP, 12 GFX EUs, 600 MHz GFX 1.04/2.24 GHz, 1 M Cache, 4W TDP/3W SDP, 12 GFX EUs, 600 MHz GFX 1.04/2.0 GHz, 1 M Cache, 5W TDP/4W SDP, 12 GFX EUs, 320 MHz GFX

T/s		Support for 2x SODIMM Socket max. 8GB dual channel DDR3L-1600
Integ	grated in SoC	
1		Dual Gbit LAN, 2x Intel i211
	2x	2x SATA III 1x mSATA III
	5x	1x PCle x1 Slot   1x mPCle Full/Half Size 1x mPCle Half Size
	4x / 8x	external 2x / 2x internal 2x / -
2		2x RS232 internal 8 Bit GPIO internal

io	Audio In   Line Out 1x Front Panel HD Audio

Intel HD Graphics Generation 8

LVDS 2x 24 bit 3x Display Port or 2x HDMI/1x eDP	2x DisplayPort++ 1x LVDS (2x24 bit) 1x Embedded DisplayPort
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ring and Board Information | Board Statistics I²C bus (fast mode, 400 kHz, multi-master) | Power Loss Control

ogo   OEM CMOS Defaults   LCD Control   Display Auto Detection   acklight Control   Flash Update	AMI Aptio® (UEFI) BIOS   SM-BIOS   BIOS Update   Logo Boot   Quiet Boot   HDD Password		
interface for TPM on Carrier Board	Socket for TPM 1.2 / 2.0 module		
compliant, Smart Battery Management	1x internal DC-In (12-24V) 1x external DC-In (12-24V) 1x opt. battery header for battery manager (SBM <sup>3</sup> )		
//////////////////////////////////////			
Operating: 0 +60°C Storage: -20 +80°C			
Operating: 10 90 % r. H. non cond. Storage: 5 95 % r. H. non cond.			











	conga-QA3	conga-QA3E	conga-MA3E	conga-MA3	conga-TCA3
Formfactor	Qseven, 70 x 70 mm <sup>2</sup>		COM Express Mini, 55 x 84 Type 10 Connector Layout	mm²	COM Express® Compact 95 x 95 mm², Type 6
		3 <sup>rd</sup> Gen. Inte	el® Atom™ / Celeron® process	ors ("Bay Trail")	
		Intel <sup>®</sup> Atom <sup>™</sup>	E3845 4x 1.91 GHz, L2 cache	2MB, 10W TDP	
	commercial / industrial	commercial	commercial / industrial	commercial / industrial	commercial / industrial
		Intel <sup>®</sup> Atom <sup>†</sup>	™ E3827 2x 1.75 GHz, L2 cach	e 1MB, 8W TDP	
	commercial / industrial	-	industrial	commercial / industrial	commercial / industrial
		Intel <sup>®</sup> Atom <sup>†</sup>	™ E3826 2x 1.46 GHz, L2 cach	e 1MB, 7W TDP	
	commercial	-	commercial	commercial	commercial / industrial
		Intel <sup>®</sup> Atom <sup>†</sup>	™ E3825 2x 1.33 GHz, L2 cach	e 1MB, 6W TDP	
	commercial / industrial	-			commercial
CPU		Intel® Atom™	<sup>M</sup> E3815 1x 1.46 GHz, L2 cache	2 512kB, 5W TDP	
	commercial / industrial	commercial		commercial / industrial	commercial / industrial
		Intel <sup>®</sup> Atom <sup>†</sup>	™ E3805 2x 1.33 GHz, L2 cach	e 1MB, 3W TDP	
	commercial / industrial	-	•		-
		Intel <sup>®</sup> Celero	on J1900 4x 2.0 GHz, L2 cache	2MB, 10W TDP	
	commercial	-	-	-	commercial
		Intel <sup>®</sup> Celeror	n N2930 4x 1.83 GHz, L2 cache	2MB, 7.5W TDP	
	commercial	-	-	commercial	commercial
		Intel <sup>®</sup> Celeror	n N2807 2x 1.58 GHz, L2 cache	• 1MB, 4.5W TDP	
	commercial	-	-	commercial	commercial
DRAM	max. 8 GByte dual channel DDR3L 1333MT/s	max. 8 GB ECC DDR3	yte onboard 3L 1333 MT/s	max. 8 GByte dual channel DDR3L 1333MT/s	
Chipset	Integrated in SoC				
Ethernet	Gigabit Ethernet Intel® I210		Intel® I218LM GbE Phy		Intel® i210 Gigabit Ethernet
Serial ATA	2x	2x	2x	2x	-
PCI EXPRESS®	Зх	Зх	4x	4x	5x
USB 3.0/2.0	1x / 6x	1x / 6x	1x / 7x	1x / 7x	1x / 8x
Other I/O			SDIO, GPIO, SPI, LPC, I <sup>2</sup> C		
Mass Storage	eMMC 4.5 up to 64 GB	onboard flash Byte (optional)			
Sound			Intel® High Definition Audio	)	
Graphics			Intel <sup>®</sup> HD Graphics Gen. 7		
Video Interface	LVDS 2x 24   HDMI   DisplayPort		LVD: 1x Displ	S 1x 24 bit JayPort/HDMI	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   I²C bus (fast mode, 400 kHz, multi-master)   Power Loss Control			Statistics	
Embedded BIOS Feature	AMI Aptio® UEFI 2.x firmwar   OEM Logo   OEM CMOS Defaults   LCD Control   Display Auto Detection   Backlight Control   Flash Update				
Security	LPC interface for 1	C interface for TPM on Carrier Board Optional discrete "Trusted Platform Module" (TPM)			dule" (TPM)
Power Management	ACPI 5.0 compliant, Smart Battery Management				
Operating Systems	Microsoft® Windows 10   Microsoft® Windows 10 IoT   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				
Humidity	Operating: 10 90 % r. H. non cond. Storage: 5 95 % r. H. non cond.				



#### conga-PA3

ormfactor	Pico-ITX 72 x 100 mm²	Thin Mini-ITX 170 x 170 x 20 mm³		
	3rd Gen. Intel® Atom™ / Celeron® processors ("Bay Trail")			
	Intel® Atom™ E3845 4x 1.91 0	GHz, L2 cache 2MB, 10W TDP		
	commercial / industrial	commercial		
	Intel <sup>©</sup> Atom™ E3826 2x 1.46	GHz, L2 cache 1MB, 7W TDP		
PU	commercial / industrial	commercial		
	Intel® Celeron J1900 4x 2.0 G	Hz, L2 cache 2MB, 10W TDP		
	-	commercial		
	Intel® Celeron N2930 4x 1.83 C	GHz, L2 cache 2MB, 7.5W TDP		
	-	commercial		
RAM	max. 4 GByte on board DDR3-1333	Support for 2x SODIMM Socket, max. 8GB dual channel up to DDR3L-1333		
thernet	Gbit LAN 1x Intel i211 (i210 for industrial version)	Dual Gbit LAN 2x Intel i211		
erial ATA	1x SATA II 1x mSATA II	2x SATA II 1x mSATA II		
CI EXPRESS®	2x miniPCle Half Size, one shared with mSATA	1x PCle x1 Slot   1x mPCle Full/Half Size 1x mPCle Half Size		
SB 3.0/2.0	2x / 2x (1x Client)	external 2x / 2x internally 2x / 2x		
ther I/O	1x RS-232 1x micro SD slot Feature connector	2x RS232 internal 8 Bit GPIO internal 1x micro SD slot		
ound	Audio In/Out SPDIF OUT	Audio In/Out 1x Front Panel HD Audio		
raphics	Intel HD Graphics Generation 8			
ideo Iterface	1x 24-bit Dual Channel LVDS 1x DiplayPort++	1x DisplayPort++ 1x VGA 1x LVDS (2x24 bit) 1x Embedded DisplayPort 1x Backlight (Power, control)		
ongatec oard ontroller	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			
mbedded IOS Feature	AMI Aptio® (UEFI) BIOS   SM-BIOS   BIOS Update   Logo Boot   Quiet Boot   HDD Password			
ecurity	LPC interface for TPM on Carrier Board	Optional onboard TPM 1.2		
ower lanagement	1x internal DC-In (12V) 1x ext. DC-In (12V)	1x internal DC-In (12-24V) 1x opt. battery header for battery manager (SBM3) 1x ext. DC-In 12V-24V		
perating ystems	Microsoft® Windows 10   Microsoft® Windows 10 IoT   Microsoft® Windows Microsoft® Windows Embedded Compact 7   Microsoft® Win	s 8   Microsoft® Windows Embedded Standard 8   Microsoft® Windows 7   Idows Embedded Standard 7   Linux   Yocto   WindRiver IDP		
emperature	Operating commercial: 0 +60°C Operating industrial: -40 +85°C Storage: -40 +85°C			
umidity	Operating: 10 90 % r. H. non cond. Storage: 5 95 % r. H. non cond.			



#### conga-IA3











conga-QMX6

	conga-QG	conga-TCG	conga-QAF	conga-BAF
Formfactor	Oseven 70 x 70 mm²	COM Express Compact, Type 6 95 x 95 mm <sup>2</sup>	Oseven 70 x 70 mm²	COM Express Basic, Type 2 95 x 125 mm <sup>2</sup>
	AMD Embedded GX-Series SOC		AMD Embedded	G-Series Processors
	GX-210HA 2x 1 GX-412HC 4x 1.2	1.0 GHz, 9W TDP 2/1.6 GHz, 6W TDP	G-T56N 2x 1.6	GHz, 18W TDP
	commercial	commercial	-	commercial
	GX-210JA 2x 1	.0 GHz, 6W TDP	G-T40N 2x 1.0 GHz, 9W TDP	
	commercial	-	-	commercial
	GX-209HA 2x 1	.0 GHz, 9W TDP	G-T44R 1.2 GHz, 9W TDP	
	industrial	industrial	-	commercial
CPU	GX-212JC 2x 1.2	/1.4 GHz, 7W TDP	G-T40R 1.0 G	GHz, 5.5W TDP
	commercial	commercial	commercial	commercial
	GX-420CA 4x 2 GX-217GA 2x 1. GX-222GC 2x 2.2	.0 GHz, 25W TDP 65 GHz, 15W TDP /2.4 GHz, 15W TDP	G-T40E 2x 1.0 GHz, 6.4W TDP	
	-	commercial	commercial	commercial
	GX-415GA 4x 1 GX-411GA 4x 1. GX-424CC 4x 2	.5 GHz, 15W TDP 65 GHz, 15W TDP 4 GHz, 25W TDP	G-T16R 615 MHz, 4.5W TDP	
	-	commercial	commercial	-
DRAM	max. 8 GByte ECC DDR3L 1333 MHz	max. 8 GByte DDR3L ECC 1600 MHz	max. 4 GByte DDR3L 1066 MT/s	Single channel up to 2x 4 GByte DDR3 SO-DIMM 1066 MT/s
Chipset	Integrated in SoC		AMD A55E Controller Hub	AMD A55E Controller Hub
Ethernet	Gigabit Ethernet Gigabit Ethernet Gigabit		Gigabit Ethernet	
Serial ATA	2x	2x	2x	4x SATA, 1x EIDE
PCI EXPRESS®	4x	4x	4x	6x PCIe, 1x PCI
USB 3.0/2.0	1x / 5x	2x / 8x	- / x8	- / x8
Other I/O	SDIO, SDCard, UART, LPC, I <sup>2</sup> C		I <sup>2</sup> C, SM, SD/MMC, LPC	1x
Mass Storage	Silicon Motion FerriSSD® up to 64GB	-	Onboard SATA Solid State Drive up to 32 GByte (optional)	-
Sound	High Definition	Audio Interface	High Definitior	a Audio Interface
Graphics	Integraded AMD Radeon <sup>™</sup> HD 8000E, DirectX®11.1 graphics with UVD 3.0, Dual Simultaneous Display Support		Radeon™ HD 6250	
Video Interface	LVDS 2x 24   HDMI   DisplayPort		LVDS 2x 24   HDMI   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		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 4 MByte Flash BIOS with congatec Embedded BIOS features		AMI-Aptio 4 MByte Flash BIOS with congatec Embedded BIOS features	
Power Management	ACPI 3.0 compliant   Smart Battery Management ACPI 3.0 compliant   Smart Battery Management		nart Battery Management	
Operating Systems	Microsoft® Windows 8   Microsoft® Windows Embedded Standard 8   Microsoft® Windows 7   Microsoft® Windows Embedded Compact 7   Microsoft® Windows Embedded Standard 7   Linux			
Temperature	Operating commercial: 0 +60°C Operating industrial: -40 +85°C Storage: -40 +85°C Operating commercial: 0 +60°C Storage: -40 +85°C			
Humidity	Operating: 10 90 % non cond. Storage: 5 95 % non cond.			

		eengu enne		
Formfactor	Qseven, 70 x 70 mm <sup>2</sup>	μQseven Rev. 2.0   70 x 40 mm²		
	NXP i.MX6 Series ARM Cortex A9			
	NXP i.MX6 Solo,	L2 cache 512kB		
	commercial (1 GHz) / industrial (800 MHz)	commercial (1 GHz)		
	NXP i.MX6 Dual Li	te, L2 cache 512kB		
CPU	commercial (1 GHz) / industrial (800 MHz)	commercial (1 GHz) / industrial (800 MHz)		
	NXP i.MX6 Dua	l, L2 cache 1MB		
	commercial (1 GHz) / industrial (800 MHz)	commercial (1 GHz) / industrial (800 MHz)		
	NXP i.MX6 Quad, L2 cache 1MB			
	commercial (1 GHz) / industrial (800 MHz)	-		
DRAM	max. 2 GByte DDR3 1066 MT/s	max. 1 GByte DDR3 1066 MT/s		
Ethernet	1x 1 Gigabit Ethernet	1x 1 Gigabit Ethernet		
Serial ATA	1x	1x (optional)		
PCI EXPRESS®	1x	1x		
USB 2.0	5x USB (shared with 1x USB OTG Client)			
Other I/Os	CAN Bus, UART, SDIO, I <sup>2</sup> C, SPI MIPI CSI on flat foil cable	CAN Bus, UART, SDIO, I <sup>2</sup> C, SPI		
Mass Storage	Onboard Solid State Drive (eMMC) up to 32 GByte (optional) on board MicroSD socket	Onboard Solid State Drive (eMMC) up to 32 GByte (optional)		
Sound	I2S			
Graphics	Integrated in NXP i.MX6 Series Video (VPU)   2D Graphics (GPU2D) and 3D Graphics (GPU3D)   3D graphics with 4 shaders up to 200MT/s   dual stream 1080p/720p decoder/encoder. OpenGL   OpenCL and OpenVG			
Video Interface	2x LVDS (2x 24 bit)   1x LVDS (1x 24 bit)   HDMI			
congatec Board Controller	-	-		
Embedded BIOS Feature	U-Boot boot loader			
Power Management	-	By Operating System		
Operating Systems	Android   Microsoft® Windows Embedded Con	npact 7   Linux   BSPs with OS drivers and tools		
Temperature	Operating commercial: 0 +60°C Storage: -4	Operating industrial: -40 +85°C 40 +85°C		
Humidity	Operating: 10 90 % r. H. non cond	d. Storage: 5 95 % r. H. non cond.		



#### conga-UMX6



### **Performance Class** fast and energy efficient

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



conga-TS175



Formfactor	COM Express® Basic 95 x 125 mm², Type 6	COM Express® Compact 95 x 95 mm², Type 6	
	7 <sup>th</sup> Gen. Inte	el® Core™ / Celeron® proce	
CPU	Intel® Xeon® E3-1505MV5 4x 3.0/4.0 GHz, Cache 8MB, 45/35W TDP Intel® Xeon® E3-1505LV5 4x 2.2/3.0 GHz, Cache 8MB, 25W TDP Intel® Core™ i7-7820EQ 4x 3.0/3.7 GHz, Cache 8MB, 45/35W TDP Intel® Core™ i5-7440EQ 4x 2.9/3.6 GHz, Cache 6MB, 45/35W TDP Intel® Core™ i5-7442EQ 4x 2.1/2.9GHz, Cache 6MB, 25W TDP Intel® Core™ i3-7100E 2x 2.9 GHz, Cache 3MB, 35W TDP Intel® Core™ i3-7102E 2x 2.1 GHz, Cache 3MB, 25W TDP	Intel® Core® i7-7 Intel® Core® i5- Intel® Core® i Intel® Celeror	
DRAM	max. 32 GByte DDR4 Intel® Xeon® and Intel® Core with ECC optional		
Chipset	Mobile Intel 100 Series Chipset		
Ethernet	Intel® I219LM GbE	Phy.	
Serial ATA	4x	3x	
PCI EXPRESS®	8x PCI Express, 1x 16 (PEG)	бх	
USB 3.0/2.0	4x / 8x	4x / 8x	
Other I/O	SPI, LPC, SM, 2xSerial, GPIO/SDIO, I <sup>2</sup> C	MIPI-CSI (Flatfoil), SM, I <sup>2</sup> C 2xSerial, LPC	
Sound	Digital High Definition Audio Interface with support for multiple audio cod		
Graphics		Intel® Gen9 HD Graphic	
Video Interface	LVDS 2x 24 bit/eDP, VGA 3x DisplayPort/HDMI/DVI	LVDS 2x 24 bit/eDP, VGA 2x DisplayPort/HDMI/DVI	
congatec Board Controller	Multi Stage Watchdog   non-volatile User Data Storage   Manufacturing and Boarc I²C bus (fast mode, 400 kHz, multi-master)		
Embedded BIOS Feature	AMI-Aptio UEFI BIOS, congatec Em		
Security	Optional discrete "Trusted Platform N		
Power Management	ACPI 4.0 with Battery support		
Operating Systems	Microsoft® Windows 10 (64bit	only)   Microsoft® Windows	
Temperature	Opera	ting: 0 +60°C Storage:	
Humidity	Operating: 10 - 1	90°C r. H. non cond Storage	





conga-IC175

Thin Mini-ITX 170 x 170 x 20 mm<sup>3</sup>

e™ / Celeron<sup>®</sup> processors ("Kabylake")

Intel® Core® i7-7600U 2x 3.9 / 2.8 GHz, Cache 4MB, 15W TDP, 7.5W cTDP Intel® Core® i5-7300U 2x 3.5/2.6 GHz, Cache 3MB, 15W TDP, 7.5W cTDP Intel® Core® i3-7100U 2x 2.4 GHz, Cache 3MB, 15W TDP, 7.5W cTDP Intel® Celeron® 3965U 2x 2.2 GHz, Cache 2MB, 15W TDP, 10W cTDP

Up to 32 GByte dual channel DDR4 memory			
Integrate	d PCH-LP		
	Dual Gbit LAN 1x Intel® i219LM GbE AMT 11 supported 1x Intel i211		
	3x		
	PCIe x4 Slot (Gen.3) 1x Full/Half-size Mini PCIe Slot with micro SIM slot		
łx	externally 4x / - internally - / 4x		
CSI (Flatfoil), SM, I²C, GPIO/SDIO, rial, LPC	RS232 internal   8 Bit GPIO internal   M.2 Type B (2230/2242)   Integrated Sensor Hub		
or multiple audio codecs	Audio In/Out 1x Internal stereo speaker 1x Digital Microphone (SPDIF) 1x Front Panel HD Audio		
el® Gen9 HD Graphics			
2x 24 bit/eDP, VGA splayPort/HDMI/DVI	2x DisplayPort++ 1x Backlight (Power, control) 1x LVDS (2x24 bit) 1x Embedded DisplayPort   1x opt. CEC		
ufacturing and Board Information   Board Statistics   BIOS Setup   Data Backup   0 kHz, multi-master)   Power Loss Control			
I BIOS, congatec Embedded BIOS			
e "Trusted Platform Module" (TPM).			
	1x internal DC-In (12-24V) 1x external DC-In (12V-24V) 1x opt. battery header for battery manager (SBM <sup>3</sup> )		
Microsoft® Windows 10 IoT Enterprise (64bit only)   Linux			
+60°C Storage: -20 +80°C			

. H. non cond Storage: 5 - 95% r.H non cond.



	conga-TS97	conga-TC97	
Formfactor	COM Express <sup>®</sup> Basic 95 x 125 mm², Type 6	COM Express® Comp 95 x 95 mm², Type 6	
	5 <sup>th</sup> Ger	n. Intel® Core™ / Xeon®	
CPU	Intel® Core <sup>™</sup> i7-5850EQ 4x 2.7/3.4 GHz, 47-37W TDP Intel® Core <sup>™</sup> i7-5700EQ 4x 2.6/3.4 GHz, 47-37W TDP Intel® XEON® E3-1278LV4 4x 2.0/3.3 GHz, 47W TDP Intel® XEON® i7-5850EQ 4x 1.8/3.2 GHz, 47W TDP	int Int I	
DRAM		max. 32 GByte DD	
Chipset	Intel® QM87 and HM86		
Ethernet	Intel <sup>®</sup> I218-LM GbE Phy		
Serial ATA	4x	4x	
PCI EXPRESS®	7x & 16 (PEG Port)	4x	
USB 3.0 / 2.0	4x / 8x	2x / 8x	
Other	LPC, I²C, 2x Serial, GPIO	LPC, I <sup>2</sup> C, GPIO	
Sound	Digital High Definition Audio Interface		
Graphics		Intel® HD G	
Video Interface	LVDS 2x 24 bit, VGA 3x DisplayPort/HDMI/DVI	LVDS 2x 24 bit, VGA 2x DisplayPort/HDMI/	
congatec Board Controller	Multi Stage Watchdog   non-volatile User Data Storage   Manufacturing a I²C bus (fast mode, 400 kHz, multi-		
Embedded BIOS Feature	AM	11-Aptio UEFI BIOS, cong	
Security	Optional discrete "Trusted F		
Power Management	ACPI 4.0 with Battery support		
Operating Systems	Microsoft® Windows 10   Microsoft® Windows 10 Io Microsoft® Windows Embe	T   Microsoft® Windows 8 edded Compact 7   Micro	
Temperature	C	Operating: 0 +60°C	
Humidity	Operating:	10 - 90°C r. H. non cond	





mpact

Thin Mini-ITX 170 x 170 x 20 mm<sup>3</sup>

on<sup>®</sup> processors ("Broadwell")

Intel<sup>®</sup> Core<sup>™</sup> i7-5650U 2x 2.2/3.1 GHz, Cache 4MB, 15W TDP Intel<sup>®</sup> Core<sup>™</sup> i5-5350U 2x 1.8/2.9 GHz, Cache 3MB, 15W TDP Intel<sup>®</sup> Core<sup>™</sup> i3-5010U 2x 2.1 GHz, Cache 3MB, 15W TDP Intel<sup>®</sup> Celeron 3765U 2x 1.9 GHz, Cache 2MB, 15W TDP

DDR3L 1600 MHz

Intel<sup>®</sup> 9 Series PCH-LP Dual Gbit LAN 1x Intel i218LM AMT 9.5 supported 1x Intel i211 3x SATA III 1x mSATA III PCIe x4 Slot (Gen.2) 1x Full/Half-size Mini PCIe Slot with SIM slot 1x Full/Half-size Mini PCIe Slot externally 4x / internally - / 4x RS232 internal, 8 Bit GPIO internal, Feature Connector Audio In/Out 1x Internal stereo speaker 1x Digital Microphone (SPDIF) 1x Front Panel HD Audio D Graphics 2x DisplayPort++ 1x Backlight (Power, control) | 1x LVDS (2x24 bit) MI/DVI 1x Embedded DisplayPort | 1x opt. CEC ng and Board Information | Board Statistics | BIOS Setup | Data Backup | ulti-master) | Power Loss Control congatec Embedded BIOS ed Platform Module" (TPM) 1x internal DC-In (12-24V) 1x external DC-In (12-24V) 1x opt. battery header for battery manager (SBM<sup>3</sup>) ws 8 | Microsoft® Windows Embedded Standard 8 | Microsoft® Windows 7 | licrosoft® Windows Embedded Standard 7 | Linux Storage: -20 .. +80°C

ond Storage: 5 - 95% r.H non cond.











	conga-TS87	conga-TC87	conga-IC87		
Formfactor	COM Express <sup>®</sup> Basic 95 x 125 mm², Type 6	COM Express <sup>®</sup> Compact 95 x 95 mm², Type 6	Thin Mini-ITX 170 x 170 x 20 mm³		
	4 <sup>th</sup> Gen. Intel <sup>®</sup> Core™ / Celeron <sup>®</sup> processors ("Haswell")				
СРU	Intel® Core™ i7-4700EQ 4x 2.4/3.4 GHz, 47W TDP   Intel® Core™ i5-4400E 2x 2.7/3.3 GHz, 37W TDP   Intel® Core™ i5-4402E 2x 1.6/2.7 GHz, 25W TDP   Intel® Core™ i3-4100E 2x 2.4 GHz, 37W TDP   Intel® Core™ i3-4102E 2x 1.6 GHz, 25W TDP   Intel® Core™ i3-4102E 2x 1.6 GHz, 25W TDP   Intel® Celeron® 2000E 2x 2.2 GHz, 37W TDP   Intel® Celeron® 2002E 2x 1.56 GHz, 25W TDP	Intel <sup>®</sup> Core™ i7-4650U 2x 1.7 Intel <sup>®</sup> Core™ i5-4300U 2x 1.9, Intel <sup>®</sup> Core™ i3-4010U 2x Intel <sup>®</sup> Celeron <sup>®</sup> 2980U 2x	/3.3 GHz, Cache 4MB, 15W TDP /2.9 GHz, Cache 3MB, 15W TDP ‹ 1.7, Cache 3MB, 15W TDP : 1.6, Cache 3MB, 15W TDP		
DRAM	max. 32 GByte DDR3L 1600 MHz				
Chipset		Intel® 8 Series PCH-LP			
Ethernet	Intel <sup>®</sup> I218	Dual Gbit LAN 1x Intel i218LM AMT 9.5 supported 1x Intel i211			
Serial ATA	4x	4x	3x SATA III 1x mSATA III		
PCI EXPRESS®	8x PCI Express, 1x 16 (PEG)	4x	PCIe x4 Slot (Gen.2) 1x Full/Half-size Mini PCIe Slot with SIM slot 1x Full/Half-size Mini PCIe Slot		
USB 3.0 / 2.0	4x / 8x	2x / 8x	externally 4x / - internally - / 4x		
Other	LPC, SPI, GPIO, I <sup>2</sup> C	LPC, I <sup>2</sup> C, 2xSerial, SPI, GPIO	RS232 internal 8 Bit GPIO internal Feature Connector		
Sound	Digital High Definition Audio Interface		Audio In/Out 1x Internal stereo speaker 1x Digital Microphone (SPDIF) 1x Front Panel HD Audio		
Graphics	Intel® HD Graphics				
Video Interface	LVDS 2x 24 bit, VGA 3x DisplayPort/HDMI/DVI	LVDS 2x 24 bit 2x DisplayPort/HDMI/DVI	2x DisplayPort++ 1x Backlight (Power, control)   1x LVDS (2x24 bit) 1x Embedded DisplayPort   1x opt. CEC		
congatec Board Controller	Multi Stage Watchdog   non-volatile User Data Storage   Manufacturing and Board Information   Board Statistics   BIOS Setup   Data Backup   I <sup>2</sup> C bus (fast mode, 400 kHz, multi-master)   Power Loss Control				
Embedded BIOS Feature	AMI-Aptio UEFI BIOS, congatec Embedded BIOS		AMI Aptio® (UEFI) BIOS   SM-BIOS   BIOS Update   Logo Boot   Quiet Boot   HDD Password		
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	ACPI 4.0 with Battery support		1x internal DC-In (12-24V) 1x opt. battery header for battery manager (SBM3) 1x external DC-In (12-24V)		
Operating Systems	Microsoft® Windows 10   Microsoft® Windows 10 IoT   Microsoft® Windows 8   Microsoft® Windows Embedded Standard 8   Microsoft® Windows 7   Microsoft® Windows Embedded Compact 7   Microsoft® Windows Embedded Standard 7   Linux				
Temperature	Operating: 0 +60°C	Operating: 0 +60°C			
Humidity	Operating: 10 - 90°C r. H. non cond Storage: 5 - 95% r.H non cond.		Operating: 10 - 90°C r. H. non cond		

	conga-TS77	conga-TS67	conga-TR3	conga-TFS
Formfactor		COM Express® Basic, (95 x 125	, mm²), Type 6 Connector Layout	
	3 <sup>rd</sup> Gen. Intel® Core processors ("Ivy Bridge")	2 <sup>nd</sup> Gen. Intel® Core processors ("Sandy Bridge")	AMD Embedded RX-Series Processors	AMD Embedded R-Series Processors
CPU	Core <sup>™</sup> i7-3615QE, 4x 2.3 GHz Core <sup>™</sup> i7-3612QE, 4x 2.1 GHz Core <sup>™</sup> i7-3517UE, 2x 2.5 GHz Core <sup>™</sup> i7-3517UE, 2x 1.7 GHz Core <sup>™</sup> i5-3610ME, 2x 2.7 GHz Core <sup>™</sup> i3-3120ME, 2x 2.4 GHz Core <sup>™</sup> i3-3217UE, 2x 1.6 GHz Celeron <sup>®</sup> 847E, 2x 1.1 GHz Celeron <sup>®</sup> 847E, 1x 1.4 GHz Celeron <sup>®</sup> 927UE, 1x 1.5 GHz Celeron <sup>®</sup> 1020E, 2x 2.2 GHz Celeron <sup>®</sup> 1047U, 2x 1.4 GHz	Core™ i3-2340UE, 2x 1.3 GHz Core™ i7-2610UE, 2x 1.5 GHz Core™ i7-2655LE, 2x 2.2 GHz Celeron® B810E, 2x 1.6 GHz	RX-421BD, 4x 2.1/3.4 GHz RX-418GD, 4x 1.8/3.2 GHz RX-216GD, 2x 1.6/3.0 GHz GX-217GI, 2x 1.7/2.0 GHz	R-464L, 4x 2.3 GHz R-460H, 4x 1.9 GHz R-272F, 2x 2.7 GHz
DRAM	max. 32 GByte DDR3 1600 MHz	max. 32 GByte DDR3 1333 MHz	max. 32 GByte DDR4 with ECC	max. 32 GByte DDR3L 1600 MHz
Chipset	Intel® BD82QM77 PCH	Intel® BD82QM67 PCH / Intel® BD82HM65 (for Celeron)	Integrated in SOC	AMD A70M Controller Hub
Ethernet	Intel® 82579LM GbE Phy	Intel® 82579LM GbE Phy	Intel GBE Controller i211	Realtek RTL81111GN
Serial ATA	4x	4x	2x	4x
PCI EXPRESS®	7x	7x	3x	7x
PEG	1x	1x	1x (x8)	1x
USB 3.0 / 2.0	4x / 8x	- / 8x	4x / 8x	4x / 8x
Other		Express Card	d, GPIO, SDIO	
Sound	Digital High Definition Audio Interface with support for multiple audio codecs			
Graphics	Intel <sup>®</sup> HD Graphics 4000	Intel <sup>®</sup> HD Graphics 3000	Integrated AMD Radeon™ 10000 Graphics	AMD Radeon HD 7000G Series Graphics
Video nterface	LVDS 2x 24 bit, VGA 3x DisplayPort/HDMI/DVI		LVDS 2x 24 bit 2x DisplayPort/HDMI/DVI	LVDS 2x 24 bit 3x 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			
Security	Optional discrete "Trusted Platform Module" (TPM)			
Power Management	ACPI 3.0 with Battery support		ACPI 5.0 with Battery support	ACPI 3.0 with Battery support
Operating Systems	Microsoft® Windows 8   Microsoft® Windows 7   Microsoft® Windows Embedded Standard   Microsoft® Windows XP   Linux		Microsoft® Windows 10 Microsoft® Windows 8.1   Microsoft® Windows 8   Linux	Microsoft® Windows 8   Microsoft® Windows 7   Microsoft® Windows Embedded Standard, Microsoft® Windows XP   Linux
Temperature	Operating: 0 +60°C Storage: -20 +80°C			
Humidity	Operating: 10 - 90% r. H. non cond. Storage: 5 - 95% r. H. non cond.			

### **COM Cooling Solutions**

#### **Cooling solutions for COM Express**

The specifications for Qseven, COM Express and SMARC 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.



#### 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 featuring 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 the processor is cooled more optimally.



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

#### Cooling solutions for Oseven and SMARC

Heatspreader

Heatspreader inner side







**Cooling Solution** 

### **SBC Cooling Solutions**

#### Slim cooling solutions for Thin Mini-ITX boards



Active cooling solution for full Thin Mini-ITX compliant solutions at max height of 20 mm. High reliable, servo controlled fan. Leaf springs for best thermal contact to the CPU. Installed phase change material for optimized heat transfer allows for best turbo boost performance. Solid mechanics with retention frame mounted at the rear side of the board enable high shock and vibration levels.



Extreme slim Thin Mini-ITX board with installed cooling

#### Heat spreader and passive cooling solution for Pico-ITX boards

Heatspreader with copper block and phase change material for conduction cooling

Flat surface for best heat transmission to a metal chassis





The CPU as heat generating component is placed at the rear 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.

Passive cooler with spring loaded mounting



Rottom view with phase change material



- Passive cooling solution for full Thin Mini-ITX compliant solutions at max height of 20 mm. Installed phase change material for optimized heat transfer allows for best burst performance. Spring loaded screws for best thermal contact to the CPU. Solid mechanics with retention frame at the rear side of the board enables high shock and vibration levels. No movable parts for highest reliability.
- Optimized cooler on top of the heatspreader



Cooler and heatspreader are installed to the bottom side of the Pico-ITX board



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

### **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 routes 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 blue print to create own customized designs.



conga-B7EVAL Evaluation carrier board for COM Express Type 7 modules.



conga-TEVAL Evaluation carrier board for COM Express Type 6 modules.



conga-MEVAL Evaluation carrier board for COM Express Type 10 modules.



All tools in a box to start your rapid engineering



conga-QKit This complete kit provides the ability to start evaluating Oseven<sup>®</sup> modules immediately.



conga-QKIT/ARM This complete kit provides the ability to start evaluating Oseven<sup>®</sup> ARM modules immediately



conga-SEVAL Evaluation carrier board for SMARC 2.0 modules.



conga-QEVAL Evaluation carrier board for Qseven modules.



conga-CEVAL Evaluation carrier board for COM Express Type 2 modules.



conga-SKit This complete kit provides the ability to start evaluating SMARC modules immediately.



conga-QKIT/IOT This complete kit provides the ability to start evaluating Oseven® modules immediately.



#### **Qseven® Mobility Kit**

This kit provides the ability to start immediately evaluating Oseven® modules for all kinds of mobile applications.

### Accessories

#### IO Cards

for WLAN, Bluetooth and other I/O functionaliy





**SSDs** 

#### for SATA, M.2 and Mini PCI Express





**IO Shields** For Thin and standard Mini-ITX



OHILLE

Power Supplies for Single Board Computers



#### DRAM

congatec certified memory modules for congatec products SO-DIMM DDR3L, DDR4 and DDR4ECC memory modules.



#### Thin Mini-ITX Housing

Standard housing with integrated passive cooling for congatec Thin Mini-ITX boards 240 x 204 x 48 mm<sup>3</sup>



Front view



#### Cables

All required cables for easy implementations.



# We simplify the use of embedded technology.

Video Adapters Adaptations for multiple video standards







**Battery Manager** For max. two smart batteries. Also available as design in kit.



#### **Pico-ITX Housing**

Standard housing with integrated passive cooling for congatec Pico-ITX boards 140 x 111 x 51 mm<sup>3</sup>







Rear View

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