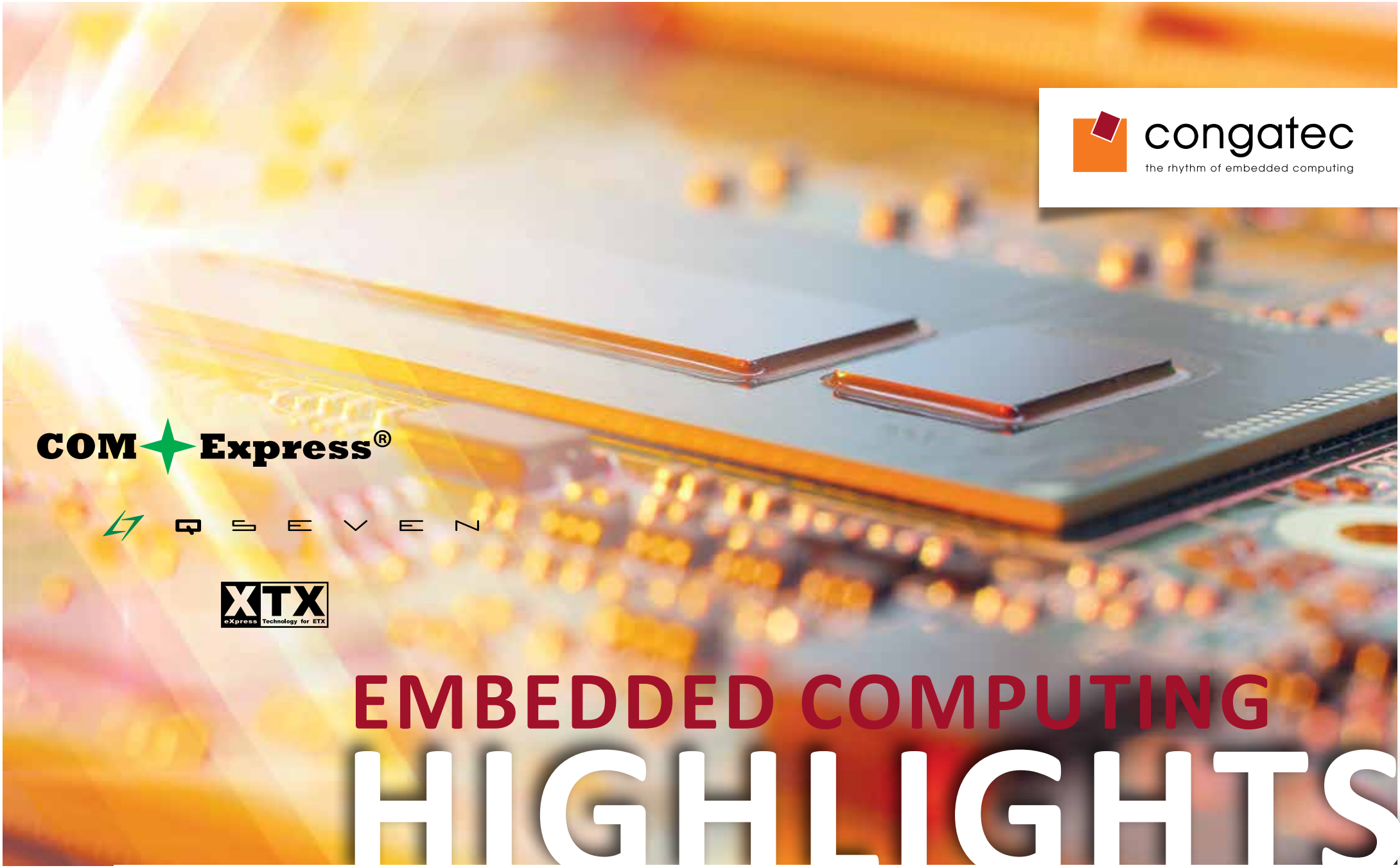
Product Guide Spring 2014



congatec
the rhythm of embedded computing

COM Express®

QSEVEN

XTX eXpress Technology for ETX

EMBEDDED COMPUTING HIGHLIGHTS

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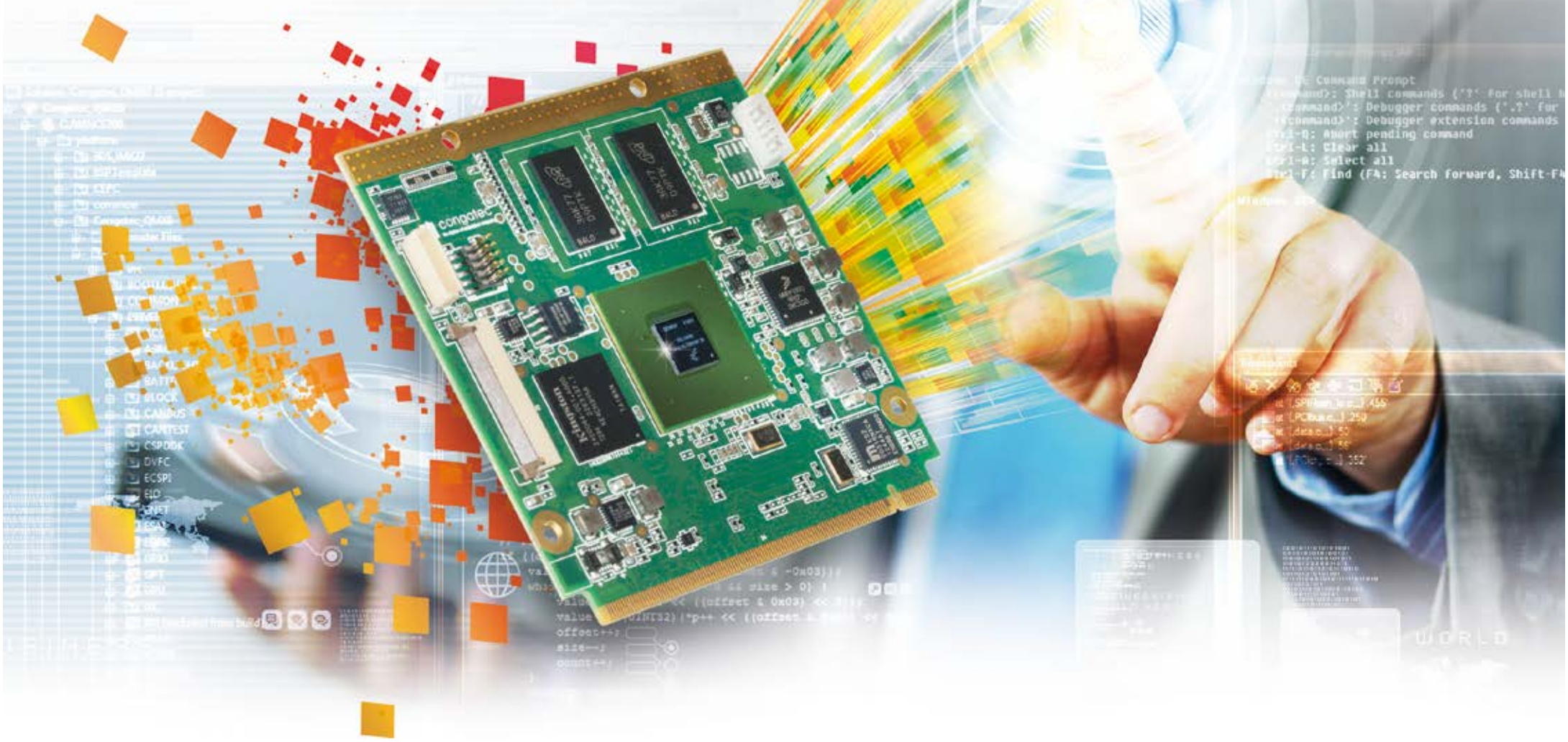
congatec AG is the **preferred global vendor** for innovative **embedded solutions** to enable competitive advantages for our customers.



Letter from the CEO

On our way to market leadership

congatec AG, headquartered in Deggendorf, Germany, is a leading provider of computer-on-modules solutions for the Qseven, COM Express, XTX and ETX standard form factors. congatec products can be deployed in highly varied industrial areas and applications such as industrial automation, medical technology as well as the aerospace and communication sectors. Besides computing solutions based on the newest x86 and ARM technology, uniquely BIOS features and related driver and board support packages form congatec's core expertise and technical know-how. Our customers enjoy extensive product lifecycle management right from the design-in phase. Specialized service providers manufacture our modules using the most up-to-date quality standards.

Since the company's inception in December 2004, congatec AG has established itself as a globally recognized expert and reliable partner for embedded computer-on-modules solutions, coupled with excellent service and support. We have secured second ranking worldwide in our market segment within the space of just eight years after our founding thanks to our clear focus.

congatec has already ranked among the Deloitte Technology Fast 50 for the second consecutive year[1]. This award distinguishes Germany's highest-growth technology companies. As a result of this success, congatec is constantly confronted by the challenge of rapidly adapting its internal structures to new circumstances on the market and also within the company, in order to remain on its sustainable growth path in the future.

Since Japan is one of congatec's most important sales markets in Asia, we opened a branch in Tokyo in 2012. Major customers in this region can now be serviced directly as a consequence. This not only creates benefits for our Japanese customers but also for globally operating major customers. The visibility of the congatec brand was also further optimized through strengthening our marketing activities in Japan. Moreover, we bolstered our sales presence in Australia and New Zealand through opening a new branch in Queensland. The Australian market offers great potential, especially in the segments of entertainment (gaming), agricultural technology, transportation management and medical technology, where congatec products can be deployed optimally.

Following the opening of the branches in Japan Australia, congatec is now represented with six branches on four continents – Asia (Taiwan and Japan), Australia, Europe (Germany and the Czech Republic), as well as North America (USA). This consistent expansion together with our strong partner network secures close customer relationships for us worldwide.

We will continue to focus on efficiency enhancement through optimizing processes and structures in the future. Through close co-operation with our technology partners Intel, AMD, Freescale and Adeneo Embedded, congatec continued to prove its leading position in technology and product innovations in 2012. In order to push further ahead with our growth strategy, we will offer products based on ARM processes and "Modules Plus" as a further service for our customers. This is just one example of new product and support initiatives that congatec is adopting in order to not only offer benefits for customers, but also to further tap target markets.

This would all be impossible without our employees' commitment. I would like to take this opportunity to again express my thanks to all congatec employees. In the passion with which they pursue their daily activities, and through customer-orientation, creativity and team spirit, they have already brought the company to a leading position, and, together with the company's management, continue to stand for a sustainable and partnership-based corporate culture.

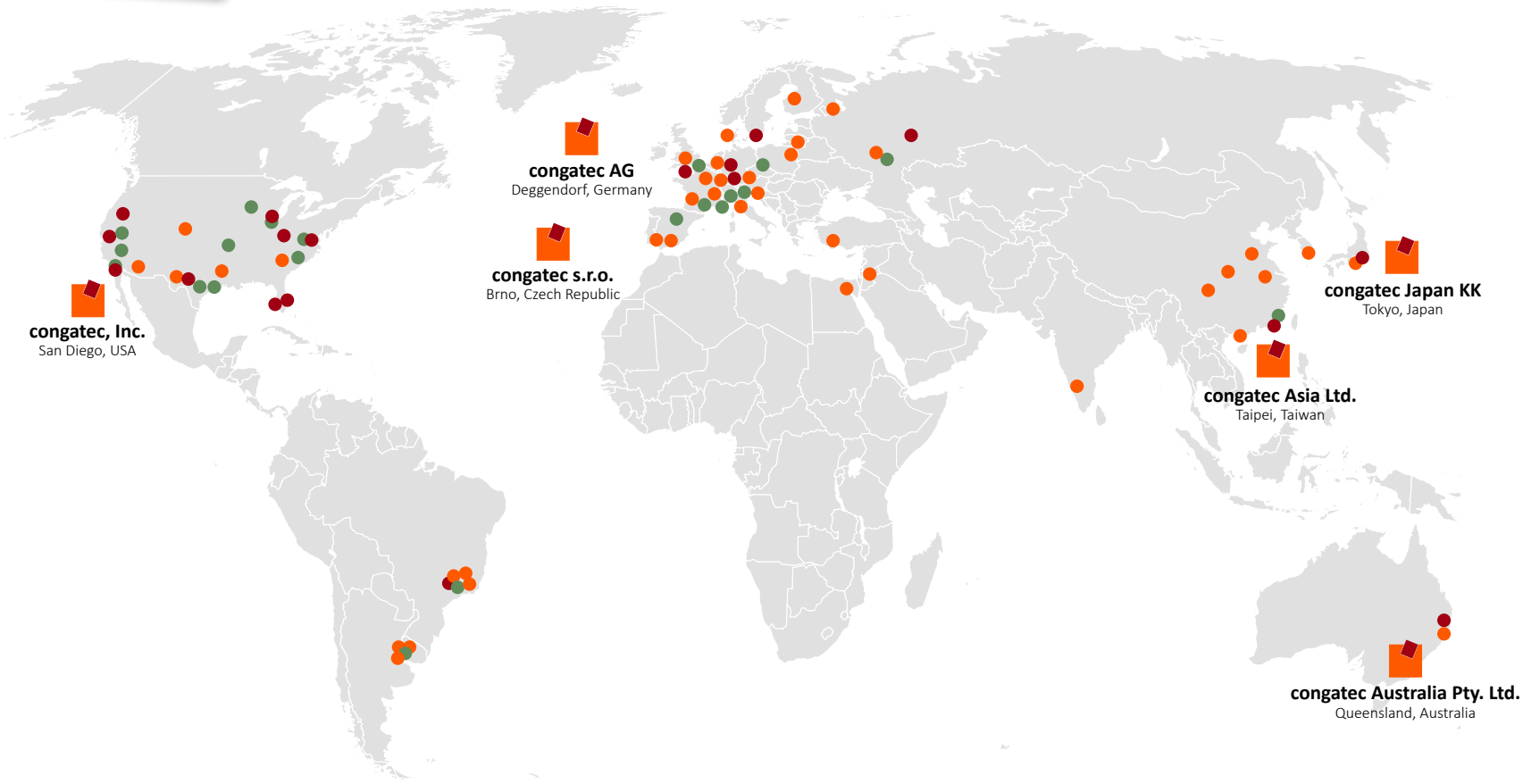
At the same time, I would also like to thank our customers and business partners for the confidence they invest in congatec, and for their loyalty and cooperative joint work.

Gerhard Edi, Chief Executive Officer

[1] Source: IMS Research: Embedded Computer Boards and Modules, 2012 Edition

About congatec – congatec AG international

www.congatec.com



The congatec rhythm is the driving force behind innovation and technology for embedded computer modules.

Economical Principal
congatec products and technologies offer innovative solutions for the commercial and industrial use of embedded computer technology.

Module Know-How
The congatec engineering teams are committed to embedded module technology. This vast amount of knowledge allows for superior hardware and software support for our customers.

Quality
congatec AG is certified in compliance with ISO9001. All congatec products are made to meet the highest quality standards.

Software and Driver Support
congatec offers advanced Board-Support-Packages, which include both the latest tested drivers from silicon vendors and the congatec specific drivers for accessing all of our additional embedded module features.

BIOS Expertise
congatec has an experienced engineering staff for BIOS UEFI and board controller firmware development. The congatec implementations expands the functionality to enable professional industry applications.

System Integration
When designing a system, special attention must be paid to issues such as heat dissipation, electrostatic / electromagnetic compatibility, signal compliance, mechanical system design, and etc. By using congatec products, you gain access to congatec's experience, which will help you deal with these issues. You can also opt to utilize our Module+ program to out-source single engineering tasks or a complete system design to congatec.

Design-In Support
The congatec teams are committed to provide the best design-in support to customers. This enables a perfect fit of the congatec Computer-On-Modules to the customer's carrier boards.

Lifecycle Support
congatec offers life cycle support for the complete lifetime of the product. congatec pays close attention to component life cycles in order to provide advanced end-of-life product notifications.

In addition, congatec focuses on efficient processing of repairs including, when applicable, replacement modules.

Focussing on core competencies
Embedded computing is congatec's passion. The clear focus on Computer-On-Modules results in a high degree of specialization for the experienced congatec employees. Accessing this power and industry knowledge allows for customers to focus on their special application know-how and industries.

ISO 9001 CERTIFICATION Intertek

Technology Partnerships

Intel® Intelligent Systems Alliance - Associate member

Intel® Technology Provider - Platinum member

AMD® Fusion Partner Premier

freescale™ Technology Partner

Adeneo Embedded Software Partner

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

Qseven® Founding member
Qseven® Specification & design guide editor

XTX™ Founding member
XTX™ Specification & design guide editor

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

PICMG® Executive Member

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Embedded computer modules are small computer boards that can be integrated into almost any application without a cable connection. Embedded computer modules are used when standard single board computers are not suitable for mechanical reasons or due to a lack of expandability.

The difference between boards and modules
Embedded computer modules are small computer boards that can be integrated in almost every application without a cable connection. All signals are transmitted via industrial board-to-board connectors to a customer- or application-specific carrier board. This carrier board contains all the hardware expansions and also allows the cable-less interface distribution.

Scalability
congatec offers modules from the lowest of power consumption up to the highest of computing performance. Not only is the computer performance scalable, but so is the interface configuration. The large product selection at congatec allows you to get precisely the required performance and interface configuration required for your application.

Cooling
A heatspreader serves as a thermal interface between the embedded computer module and the cooling solution of the system. Thus, e.g. the excess heat can be passed directly to the system housing. The heatspreader is defined in the COM specification and is uniformly implemented for all modules. The heatspreader for high performance modules utilize a congatec patented heatpipe system in order to boost cooling performance and system reliability.

Economical
By avoiding expensive and sensitive cable connections, solutions based on embedded computer modules provide optimal cost and reliability, even for mid-sized quantities.

Customer Specific Solution
The carrier board contains all of the special functionalities required by the corresponding embedded application. These functionalities can include special interfaces, a unique power supply, as well as the mechanical design and connector placement. The embedded computer module itself is plugged into the carrier board like a component. This "super component" represents a complete computer that provides the intelligence to the application.

Flexible and robust mechanical solutions
Computer-On-Modules allow for very compact solutions. Because the modules are firmly screwed down, solutions are possible even for the most difficult environmental conditions.

Long-term availability
The excellent long-term availability of all congatec modules is further extended as a result of the clearly defined module interface. As new silicon platforms are released into the marketplace, a next-generation computer module will be there to continue the life-cycle of your product. Additional End-Of-Life services allow for a smooth phase out and replacement strategy.

Minimized development risk
The complexity of carrier board development is significantly reduced when embedded computer modules are used. With lower complexity, the probability of error is naturally lower as well. This means the cost and time frame of the project can be met with a significantly lower risk.

Time-to-market
With a module-based solution, a complex CPU board design with accompanying BIOS / UEFI development is not necessary. Module-based solutions therefore offer a significantly faster time-to-market for the final product. To accelerate the time-to-market even further, congatec offers complete starter kits. The starter kits allow hardware and software development to get started prior to having the production-based carrier board completed. Appropriate board support packages for all standard operating systems provide an additional head start.

ACPI Battery Management

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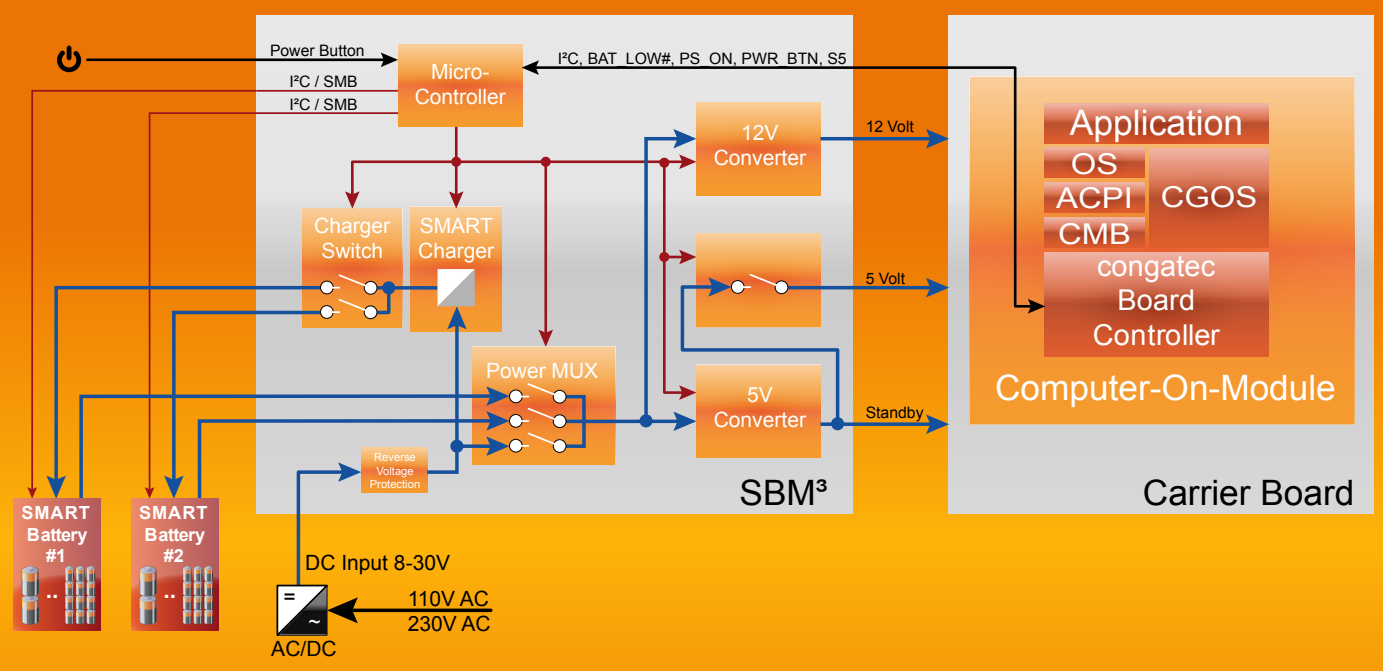
conga-SBM³

Ready to use Smart
Battery Manager Module



In combination with an ACPI operating system, the battery functionality associated with mobile platforms is supported by congatec embedded computers. Now it's much easier to build mobile embedded applications that have notebook battery functionality.

COM Advantages when Compared to a Full Custom Design

COM Standard	Qseven®	COM Express® Type2	COM Express® Type6	COM Express® Type10	ETX®	XTX™
Size	70x70 mm²	Basic 95x125 mm², Compact 95x95 mm², Mini 55x84 mm²			95x114 mm²	
Bus	PCI Express® 4 Lanes, LPC, I²C, CAN, UART	PCI Express® max. 22 Lanes, PCI, LPC, I²C	PCI Express® max. 24 Lanes, LPC, I²C	PCI Express® 4 Lanes, LPC, I²C, CAN	PCI, ISA, I²C	PCI Express® 4 Lanes, PCI, LPC, I²C
SATA/SDIO	2x / 1x	4x / -	4x / 1x	2x / 1x	- / -	4x / -
USB 2.0 / Ethernet	8x (2x USB 3.0)/ 1x 1 GBit	8x / 1x 1 GBit	8x (4x USB 3.0)/ 1x 1 GBit	8x (2x USB 3.0)/ 1x 1 GBit	4x / 1x 100 MBit	6x / 1x 100 MBit
Audio	Digital (HDA)	Digital (AC'97 / HDA)	Digital (HDA)	Digital (HDA)	Analog	Analog / Digital (AC'97 / HDA)
Display Interface	LVDS (alt. eDP) / SDVO / DisplayPort / HDMI	VGA / TVout / LVDS / 2x SDVO or PEG	VGA / LVDS (alt. eDP) / SDVO / 3x HDMI/DP / PEG	LVDS (alt. eDP) / SDVO / 1x HDMI/DP	VGA / TVout / LVDS	
I/O Bandwith over all (no Panel Signals)	~5.5 GByte/s	up to ~12.4 GByte/s	up to ~26.4 GByte/s	up to ~5.5 GByte/s	~0.6 GByte/s	~3.3 GByte/s
Software Interface (API)	cgos / EAPI					
Homepage	www.qseven-standard.org www.sget.org	www.picmg.org	www.picmg.org	www.picmg.org	www.etx-ig.com	www.xtx-standard.org

Lower Costs
COMs save money. The cost of the development and end product are dramatically reduced. 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

Improved Flexibility
COMs are flexible and can meet all performance requirements. The modules support a wide range of performance up to the Intel® Core™ i7 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

congatec Embedded BIOS/UEFI

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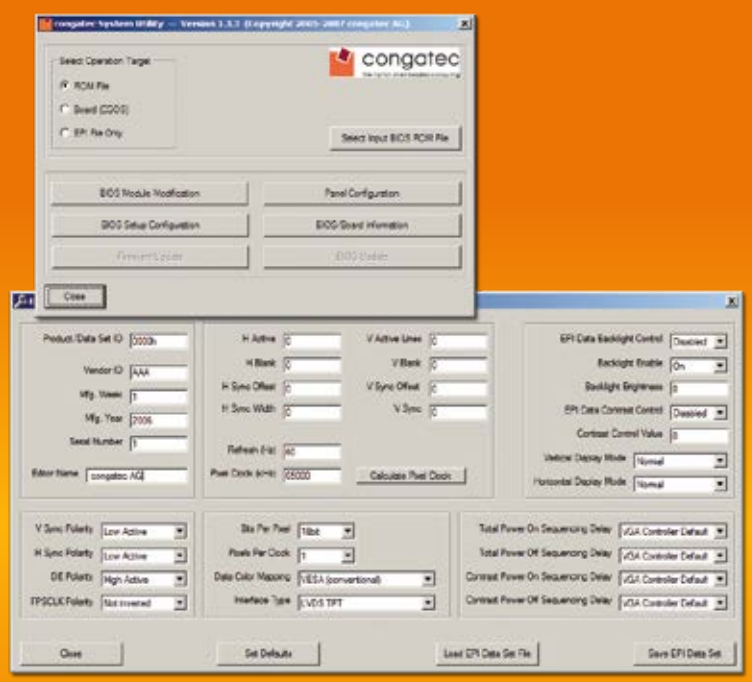
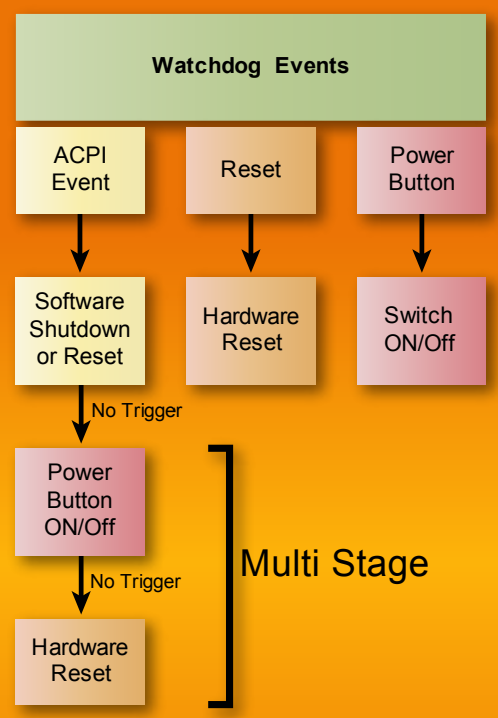


congatec System Utility



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.

Optimized Power
ACPI Power Management and System Configuration is 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, hardware reset or power button. It can either assert a single event and/or any combination of these events.

congatec Board Controller
An onboard µc fully isolates some of the embedded features, such as system monitoring or the I²C bus, from the x86 core architecture. This results in higher embedded feature performance and higher overall system reliability.

Fast Mode I²C Bus
The I²C 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 I²C Bus that provides maximum I²C bandwidth.

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

Manufacturing Data Storage
The congatec board controller provides a rich data set of manufacturing and board information: Serial Number, Article Number, EAN Code, Manufacturing and Repair Date, System Statistics and more. The BIOS also keeps track of dynamically changing running time and boot count data. All this data is accessible by a uniform API.

User Data Storage Area
congatec modules provide 32 Bytes of non- volatile storage in the EEPROM and a 64 kByte block in the BIOS flash memory.

Hardware Monitoring
The congatec BIOS has the routines to monitor critical components implemented. Fans, operating voltages and several temperature sensors can be monitored without incurring additional development costs.

Display Auto-detection
The LVDS flatpanel can be autodetected by the BIOS via EDID support or set as fixed panel timing in BIOS setup.

OEM BIOS Logo
The BIOS can display a custom logo instead of the tradional diagnostic output during POST.

OEM Customization - Do It Yourself BIOS
The congatec embedded BIOS allows customers to do create their own BIOS binary by adding OEM code and data modules. These OEM modules help reduce the need for customized BIOS versions.

OEM BIOS Code
Customer specific code can be executed while booting the system. During power on self test (POST) the congatec BIOS can give control to customer specific code. This gives customers more flexibility to initalize special hardware extensions.

OEM CMOS Defaults
The congatec embedded BIOS allows the customer to store their own defaults in flash memory.

OEM Verb Table
To initialized HDA codecs on the carrier board from BIOS level.

OEM SLP string and OEM SLIC Table
Helps to activate licensed copies of a Windows operating system (OS) so end users of the embedded system will not have to activate the OS themselves.

OEM EDID for LVDS Panel
Create your own EDID data for any LVDS flat panel and add to the list of predefined Timings offered in the BIOS setup.

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.

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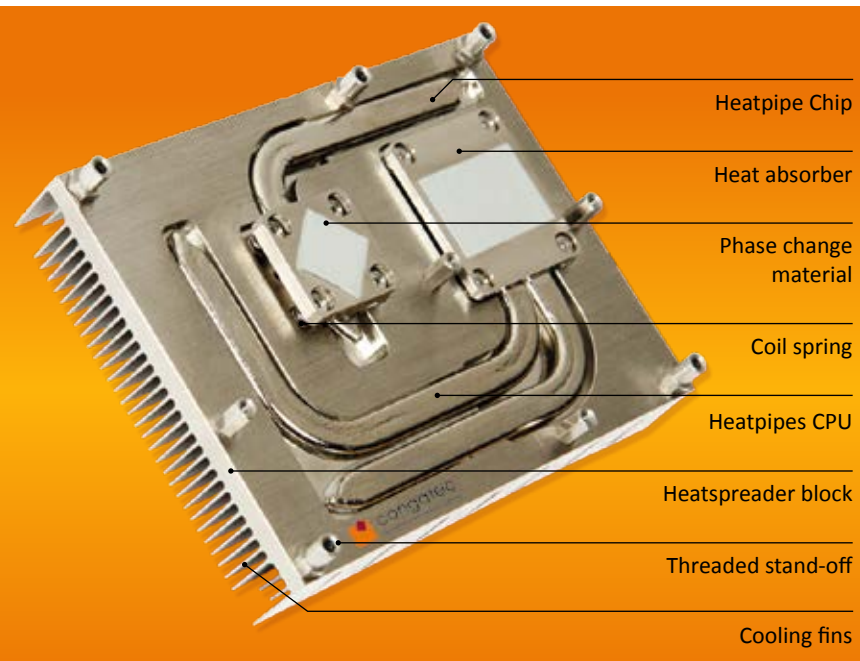
congatec's smart cooling pipes pave the way for unlimited performance growth for COM Express® modules



The new cooling system based on cooling pipes which are integrated in the standardized heatspreader of the COM Express specification. With this solution it becomes possible to cool next generation high-performance processors with a power dissipation of well over 35W TDP. The real problem are the hot spots around the processor and chipset. The congatec improved cooling concept results in a lower processor temperature, which is essential for a more frequent activation of Intel® Turbo Boost 2 Technology to ensure maximum COM performance and energy efficiency. As a result, the processor can operate at higher levels than the maximum permitted thermal design power (TDP)."

The advantages at a glance:

- Fast spot cooling for full performance
- Elimination of gap filler layer
- Elimination of mechanical stress leads to higher quality
- Better cooling extends the life span of the module
- Heat pipe principle enables innovative customer-specific cooling concepts

congatec's new heat pipe cooling design is available in different variants comprising a passive, active and customer-specific solution that creates space for innovative ideas. For example, the heat pipe can be designed in such a way that it can be connected to a customer-specific heat sink. Fanless designs are possible provided the casing is equipped with appropriately sized cooling fins. Ultimately, the design depends on the specific application. The key features of the concept are equally applicable to other electronic circuits. The new cooling solution is also ideal for systems with low power dissipation. The modules have a higher thermal reserve, which increases their life span and reliability. Average temperature reductions of 5 Kelvin can double the statistical life span – a convincing argument when considering the total cost over the lifetime of a system.

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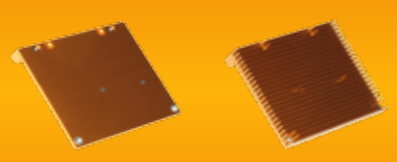
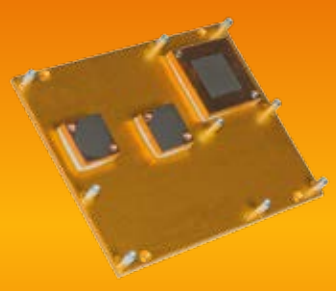
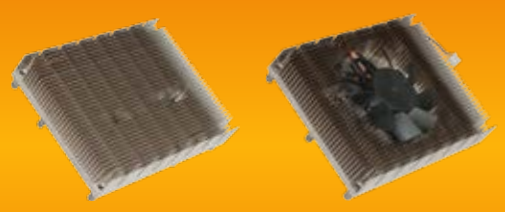


Heatspreader and passive cooling solution for Qseven®

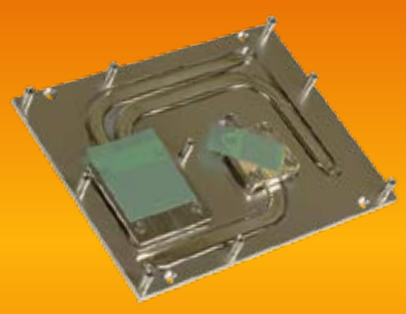


Heatspreader



Passive cooling solution Active cooling solution

Standard cooling solution



Heatpipe Heatspreader

Heatspreader Concept

The specifications for Qseven®, COM Express®, XTX™ and ETX® embedded computer modules include a heatspreader definition, which is 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.

Heatspreader Mounting

congatec heatspreader solution are optimized for vertically and horizontally mounted applications. All thermal stacks are fixed in place through the use of pins to ensure that there is no movement. Depending on top or bottom mounting versions with through holes or threads are available.

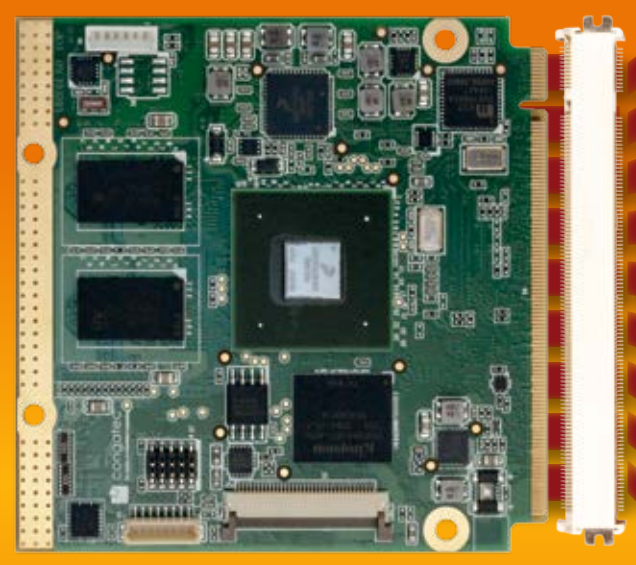
Cooling Solutions

Compared with sandwich-type constructions for heatspreaders and cooling systems, active and passive cooling solutions remove one layer from the process. The heatspreader and cooler are manufactured as one unit, which enables them to provide faster thermal conduction. For an active cooling solution, a high performance quiet fan has been integrated within the cooling fins.

Heatspreaders featuring Heatpipes

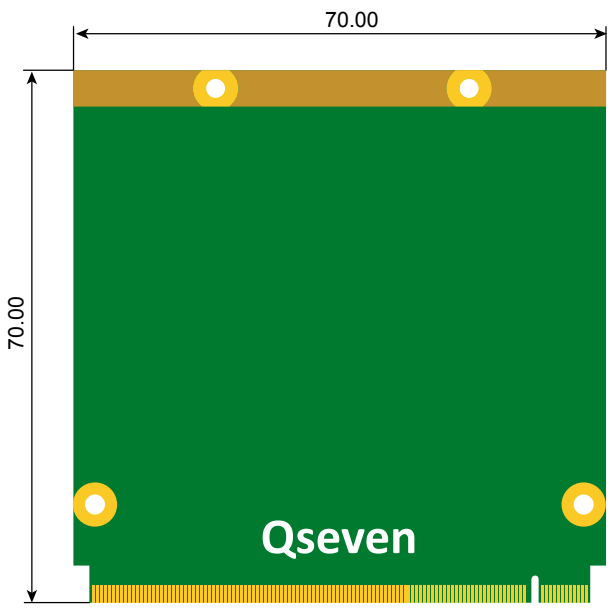
The congatec heatspreaders and cooling solutions for the high performance modules are featuring heatpipes in order to boost performance and reliabiltiy. A copper block is mounted on the chip to absorb heat and to mitigate the effects of thermal peaks. Between the chip and the copper block, a phase-change 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. All this results in fast spot cooling, good thermal connections, elimination of mechanical stress and greater cooling performance. This leads to while retaining geometric dimensions – achieving all these requirements sounds like asking the impossible. However, congatec has mastered the challenge by skilfully combining the classical solution with a structurally modified heat pipe. Unlike the classical design, a flattened heat pipe is used to transfer heat from the chip to the heat spreader plate. 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. Spiral springs with defined spring tension, as well as the heat pipe itself with its flexible height, put optimum pressure on the processor chip.

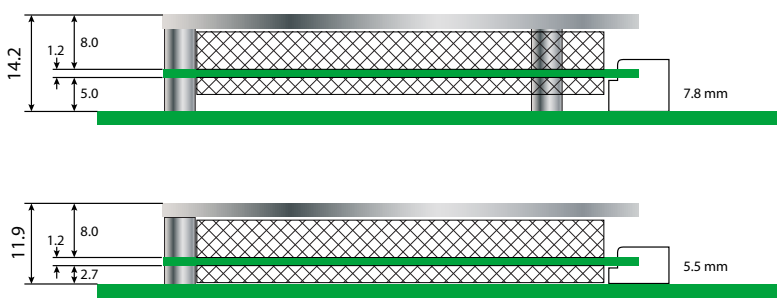
Qseven® also supports ARM processors for mobile and ultra low power consumption applications. Unlike COM Express®, XTX™ and ETX®, it is not limited to x86 processor technology. One carrier board can be equipped with x86 or ARM Qseven® modules.



conga-QMX6 original size

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 70x70 mm².





Freedom
Qseven® allows for the use of non x86 processor architectures. It 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 unlike previous Computer-On-Modules (COM) standards due to its primary focus being directed towards mobile and 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
Unlike most previous module standards, Qseven® does not require an expensive board-to-board connector. Instead, it utilizes a very affordable MXM 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, CPU's and chipsets.

Compact Size
The module's dimensions are a mere 70x70mm². This means it can be easily integrated into size constricted systems.

Slim Design
Compared to COM Express®, Qseven® enables slimmer mechanical housings.

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

QSEVEN

conga-QA3

- Based on Next Generation Intel® Atom™ Processor
- Up to 4 Cores / 2.0 GHz
- Up to 8 GByte RAM

conga-QA3

	conga-QMX6	NEW conga-QG	conga-QAF	NEW conga-QA3	conga-QA6
Formfactor	Qseven® Form Factor, 70 x 70 mm²				
CPU	Freescale® i.MX6 Series ARM Cortex A9 i.MX6 Quad, 4x 1.0 GHz i.MX6 Dual, 2x 1.0 GHz Dual Lite, 2x 1.0 GHz i.MX6 Solo, 1.0 GHz	AMD Embedded GX-Series SOC Processors GX-210HA, 2x 1.0 GHz GX-210JA, 2x 1.0 GHz GX-209HA, 2x 1.0 GHz	AMD Embedded G-Series Processors G-T40E, 2x 1.0 GHz G-T40R, 1.0 GHz G-T16R, 615 MHz	Intel® Celeron® J1900 4x 2.0 GHz Intel® Celeron® N2930 4x 1.83 GHz Intel® Celeron® N2807 1x 1.58 GHz Intel® Atom™ E3845 4x 1.91GHz Intel® Atom™ E3827 2x 1.75GHz Intel® Atom™ E3826 2x 1.46GHz Intel® Atom™ E3825 2x 1.33GHz Intel® Atom™ E3815 1.46GHz	Intel® Atom™ E600 Series Processor E680T / E680, 1.6 GHz E660T / E660, 1.3 GHz E640T / E640, 1.0 GHz E620T / E620, 600 MHz
DRAM	max. 2 GByte DDR3 1066 MT/s	max. 8 GByte ECC DDR3L 1333 MT/s	max. 4 GByte DDR3L 1066 MT/s	max. 8 GByte dual channel DDR3L 1333 MT/s	max. 2 GByte DDR2 667/800 MT/s
Chipset	-	Integrated in SoC	AMD A55E Controller Hub	Integrated in SoC	Intel® Platform Controller Hub EG20/EG20T
Ethernet	1x 1 Gigabit Ethernet	1x 1 Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet Intel® I210	Micrel® GBit Ethernet Phy KSZ9021RN
I/O Interface Serial ATA	1x	2x	2x	2x	2x
PCI EXPRESS®	1x	4x	4x	3x	3x
USB 2.0	4x and 1x USB OTG	5x	8x	6x	8x
USB 3.0	-	1x	-	1x	-
SDIO	1x	1x	1x	1x	1x
LPC Bus	-	1x	1x	1x	1x
I²C Bus	2x	4x	1x	1x	1x
Additional	1x CAN Bus, 1x UART, Android Buttons	1x UART	2x ExpressCard™	1x SPI	1x CAN Bus
Mass Storage	On board Solid State Drive (eMMC) up to 8 GByte (optional), on board MicroSD socket	Silicon Motion FerriSSD® up to 64GB	On board SATA Solid State Drive up to 32 GByte (optional)	eMMC 4.5 onboard flash up to 32 GByte (optional)	On board SATA Solid State Drive up to 32 GByte (optional)
Sound	I²S, AC97	High Definition Audio Interface			
Graphics	Integrated in Freescale i.MX6 Series	Integraded AMD Radeon™ HD 8000E, DirectX®11.1 graphics with UVD 3.0, Dual Simultaneous Display Support	Integrated AMD Radeon™ HD 6250, DirectX®11 graphics with UVD 3.0, Dual Simultaneous Display Support	Intel® HD Graphics with 4 Execution Units	Intel® Graphics Core with 2 D and 3 D Hardware Accelerator
Video Interfaces	LVDS 2x 24, HDMI	LVDS 2x 24, HDMI, DisplayPort			LVDS 1x18/1x24, Single channel SDVO interface
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	U-Boot boot loader	AMI-Aptio 4 MByte Flash BIOS with congatec Embedded BIOS features		OEM Logo, OEM CMOS Defaults, LCD Control, Display Auto Detection, Backlight Control, Flash Update	
	based on AMI Aptio UEFI				
Power Management	-	ACPI 3.0 compliant, Smart Battery Management		ACPI 5 .0 compliant, Smart Battery Management	ACPI 3.0 compliant, Smart Battery Management
Operating Systems*	Android, Linux, Microsft® Windows Embedded Compact 7	Microsoft® Windows Embedded Standard 7, Microsoft® Windows Embedded Compact 7, LINUX			
		Microsoft® Windows Embedded Standard 8			-
	-	-	Microsoft® Windows® XP, Windows® CE 6.0	-	Microsoft® Windows® XP, Windows® CE 6.0
Power Consumption	Typ. application ~3-5 Watt @ 5V		Typ. application: 4.5~10 Watt @ 5V	Typ. application: 4.5 W...12W	Typ. application -5 Watt @ 5V
Special	-	-	-	MIPI-CSI, UART	-
Temperature Range	Operating: 0 to +60°C commercial grade -40 to +85°C industrial grade Storage: -40 to +85°C	Operating: 0 to +60°C commercial grade -40 to +85°C industrial grade Storage: -40 to +85°C	Operating: 0 to +60°C Storage: -20 to +80°C	Operating: 0 to +60° C (opt. -40 to +85° C) Storage: 0 to +80° C (opt. -40 to +85° C)	
Humidity	Operating: 10 to 90 % r. H. non cond. Storage: 5 to 95 % r. H. non cond.				

conga-QKit

This complete kit provides the ability to start evaluating Qseven® modules immediately.

- conga-QEVAL evaluation carrier board
- conga-LDVI LVDS to DVI converter
- conga-FPA2 evaluation flat panel adapter
- SATA-to-CF card adapter
- SATA-to-IDE converter
- ATX power supply
- Complete cable set
- congatec USB memory stick

conga-QKIT/ARM

This complete kit provides the ability to start evaluating Qseven® ARM modules immediately

- Qseven® module based on Freescale's new i.MX6 ARM Cortex A9 processors conga-QMX6/QC-2G (PN: 016103)
- conga-QEVAL/ARM Qseven® evaluation carrier board for standard Qseven® ARM modules
- conga-LDVI/EPI LVDS to DVI converter board for digital flat panels with onboard EEPROM
- conga-ACC/I2S Audio card adapter with I2S/HDA codec
- conga-HDMI ADD2 card to connect a HDMI display
- MicroSDHC-Card 8 GByte
  Contains a ready to go bootloader image (Ubuntu Oneiric)
- HDMI to DVI-D adapter
- Standard ATX power supply (180 Watt)
- Cable set

Qseven® Mobility Kit

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

- Qseven® module based on AMD Embedded G-Series Processors conga-QAF/T40R-2G (015300)
- Mini carrier board for Qseven® conga-MCB/Qseven® DP (020731)
- congatec Smart Battery Manager Module conga-SBM3/Qseven®
- Adapter for generic LVDS panels
- USB memory stick with the latest drivers
- Universal power supply (19V, 90W),
- Rechargeable Smart Li-Ion battery pack, 2 cells, 7.2V, 4.56Ah with battery connector adapter
- 7" TFT widescreen touch monitor 800x480, LVDS
- USB touch controller
- Cable set

Qseven® Mini Carrier Board

Mini Carrier Board for Qseven® with smart battery manager interface for mobile applications and SDVO display interface support for Intel® mobile platforms.

- Small size: 95x145 mm
- 1x miniPCI Express Socket
- 1x RJ45 connector with GB Ethernet transformer
- 1x CFAST Socket, 1x SATA, 1x 8 bit SD Card socket
- 2x USB at the front panel, 4x USB on pin header
- 1x Display Port or 1x HDMI
- Dual LVDS 18/24 bits
- High Definition Audio, two 3.5' Jack on front panel, SPDIF on header
- CAN transceiver
- Power button/reset button/mini card WIFI radio disable/sleep button/LID button
- Versions for SDVO (conga-QA & conga-QA6), DisplayPort (conga-QAF) and ARM (conga-QMX6)

conga-QEVAL

Evaluation board for Qseven® modules. To achieve a quick start with Qseven® congatec offers an evaluation carrier board, which routes all the Qseven® signals to standard interface connectors.

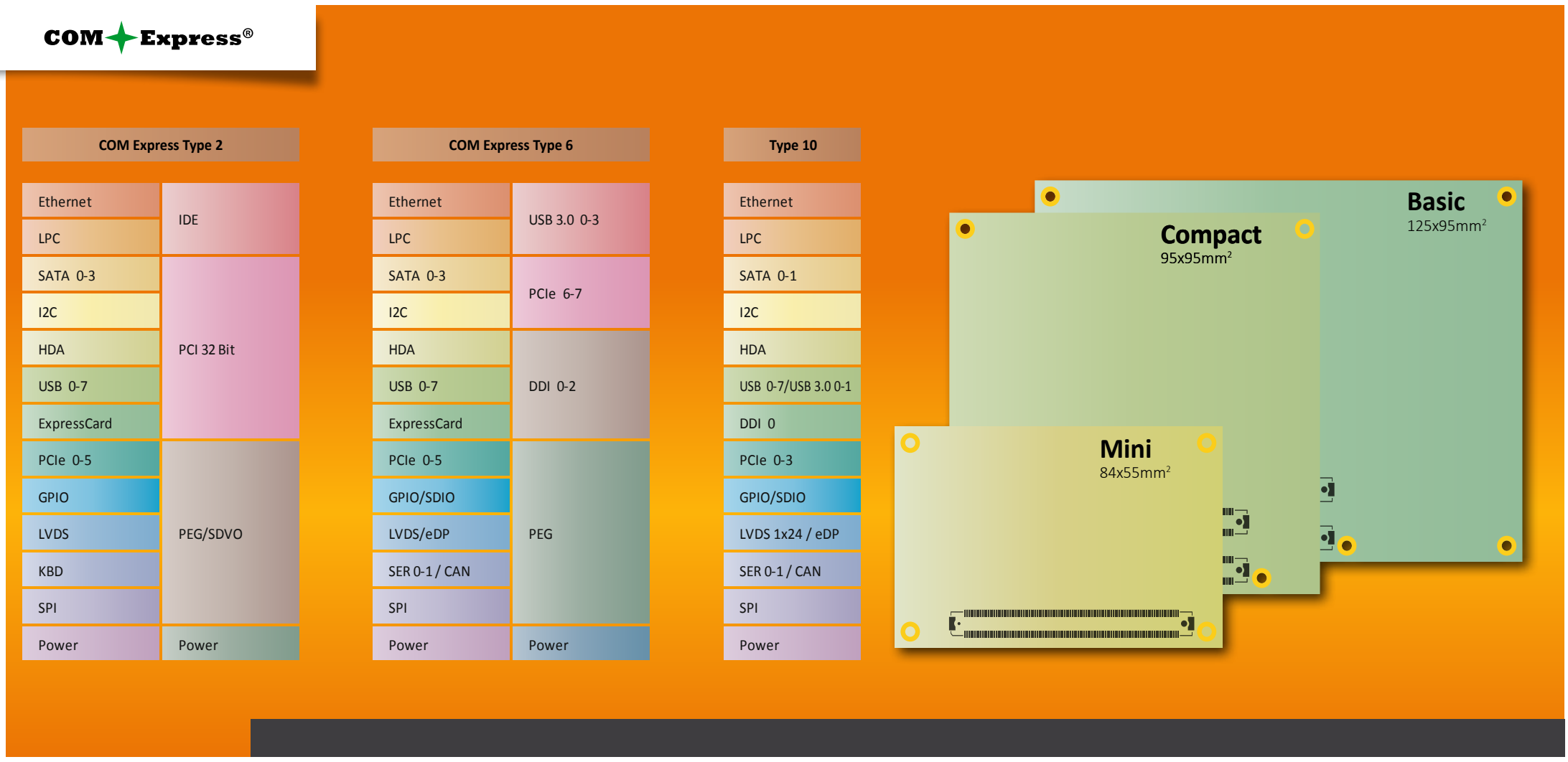
- 4x PCI Express® x1, 1x ExpressCard, 1x Mini PCI Express Card, 1x SDIO Card Socket
- Gigabit Ethernet, 6x USB 2.0 + 1x client, 2x SATA
- MIC, Line In, Line Out, SPDIF
- LPC POST code display, System speaker
- Power button, Reset button, LID button, Sleep button
- PCI Express® switch, external BIOS flash
- I^2C EEPROM, aux signals for battery management
- 1x Dual Channel LVDS
  1x SDVO, HDMI or Display Port
- Backlight control
- 12 V single power input, ATX power input connector, CMOS battery

SMART Battery Manager Module

conga-SBM³ is a complete battery manager sub system. It is designed for the use with low power congatec COM Express® compact modules and congatec Qseven® modules.

- Supports battery two smart batteries with configurations
  2S up to 4S
- Dual charge and discharge for high efficiency
- S3 (Suspend to RAM) / S5 (Soft-Off) support
- Zero current from batteries in off mode
- LEDs provide a direct view of charging and battery capacity status
- Input voltage of 8 - 30V DC, with input power delimitation
- Output 12V / ~35W, 5V / ~20W
- Battery charging max. 4A or 2x 2A in dual charge mode
- Temperature:
  Operating: 0 .. +70°C, Storage: -25 .. +80°C

COM Express® – the Concept



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 was editor within the PICMG® for the COM Express® specifications 2.0 /2.1 and for the COM Express® Design Guide.

New interfaces

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

Legacy Free

COM Express® is a legacy free standard. Outdated interfaces such as floppy, PS/2 keyboard/mouse, LPT are no longer supported. If required, these legacy interfaces can be optionally generated on the customized carrier board.
The Type 6 pin-out definition follows that path. IDE and 32 Bit PCI Bus are replaced by the new video interface DDI (switchable to DVI/HDMI or DisplayPort), additional PCI Express® lanes and the SuperSpeed signals for USB 3.0.

Size

COM Express® describes four different sizes. The major form factors are the Compact (95x95mm²) and the Basic (95x125mm²). The primary difference between the modules is the overall physical size and the performance envelope supported by each.

Thermal Design

As with Qseven® and XTX/ETX, 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 congatecs patented high efficient flat heat pipes in order to allow for maximum performance and highest reliability.

PCI Express®

COM Express® offers up to 24 PCI Express® lanes. This allows the customer to equip their embedded PC application with the next generation of PC performance. PCI Express® is a low pin count interface with maximum bandwidth per pin. PCI Express® is defined for a maximum bandwidth of up to 8 GBit/s per lane and direction.

GPIO

COM Express® defines freely usable general purpose inputs and outputs.

PCI Express® Graphics (PEG)

The PEG interface utilizes up to 16 PCI Express® lanes in order to drive an external ultra high performance graphic controller located on the carrier board. The PEG Port is available with the conga-BP77 Type 2 implementation and with most Type 6 modules.

USB

The Type 2 modules feature up to 8 USB 2.0 ports. New with Type 6 are the additional SuperSpeed signals for up to four USBs. Up to 4 USB 3.0 ports (including USB 2.0) and 4 USB 2.0 ports are available now.

Video Output

Common video outputs for Type 2 and Type 6 modules are VGA and LVDS for direct flat panel support. With Type 6, the Intel® SDVO interface was reduced to a maximum of 1 channel. New for Type 6 is the implementation of 3 DDI (Digital Display Interface). Each of the DDI can be switched to TMDS (for DVI or HDMI) or DisplayPort. The current Intel® implementation additionally allows the first DDI to be switched to SDVO mode. Future Type 6 modules will also allow for an embedded Displayport. This eDP interface will be multiplexed with the LVDS A channel.

Type 2	Type 6	Type 10
6x PCI Express®	8x PCI Express®	4x PCI Express®
PCI Express® Graphics (PEG x16, shared with SDVO)	PCI Express® Graphics (PEG x16)	-
4x SATA	4x SATA	2x SATA
8x USB 2.0	8x USB 2.0	8x USB 2.0
-	4x USB 3.0 Signals	2x USB 3.0 Signals
1x Ethernet 100/1000	1x Ethernet 100/1000	1x Ethernet 100/1000
AC'97/HDA	HDA	HDA
Flatpanel (2x24Bit LVDS)	Flatpanel (2x24Bit LVDS)	Flatpanel (2x24Bit LVDS)
VGA	VGA	-
TV Out	-	-
I²C	I²C	I²C
Low Pin Count Bus (LPC)	Low Pin Count Bus (LPC)	Low Pin Count Bus (LPC)
System Management Bus (SMB)	System Management Bus (SMB)	System Management Bus (SMB)
8x GPIO	8x GPIO	8x GPIO
2x SDVO (shared with PEG)	1x SDVO/HDMI/DP	1x SDVO/HDMI/DP
-	2x HDMI/DP	-
IDE	-	-
PCI 32 Bit	-	-
-	2x Serial (1x CAN)	2x Serial (1x CAN)
VCC (12V primary, 5V standby, 3.3V RTC)	VCC (12V primary, 5V standby, 3.3V RTC)	VCC (4.75V -20V up to 20V primary, 5V standby, 3.3V RTC)

COM Express®

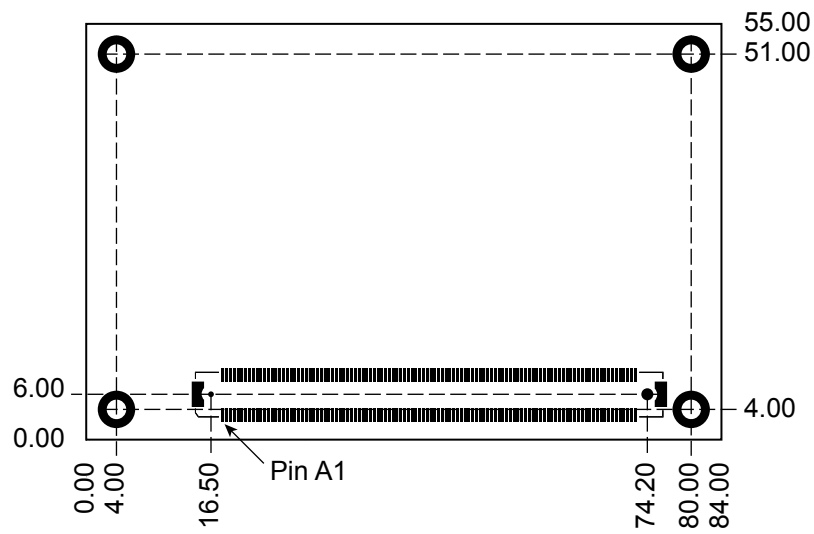
conga-MA3

- 3rd Generation Intel® Atom™
- Low Processor Power from 5 to 10 Watt TDP
- Intel® HD Graphics Generation 7
- Industrial Temperature Range

NEW

conga-MA3

Formfactor	COM Express® Mini, (55 x 84 mm²), Type 10 Connector Layout
CPU	Intel® Atom™ E3845 4x 1.91GHz Intel® Atom™ E3827 2x 1.75GHz Intel® Atom™ E3826 2x 1.46GHz Intel® Atom™ E3825 2x 1.33GHz Intel® Atom™ E3815 1.46GHz Intel® Celeron® N2930 4x 1.86 GHz
DRAM	max. 8 GByte DDR3L 1333 MHz
Chipset	Integrated in SoC
Ethernet	Intel® I210 Gigabit Ethernet
I/O Interface Serial ATA	2x
PCI EXPRESS®	4x
USB 3.0	1x
USB 2.0	7x
Sound	Digital High Definition Audio Interface
Graphics	Intel® HD Graphics Gen 7
Video Interface	LVDS 1x 24 bit, analog 1x DisplayPort/HDMI
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 2.x firmware
Power Management	ACPI 5.0 with battery support
Operating Systems*	Microsoft® Windows 8, Microsoft® Windows 7, Linux, Microsoft® Windows® embedded Standard, Microsoft® Windows® 7 Embedded Compact
Power Consumption typ.	Typ. application: 5~10 Watt @ xx
Temperature	Operating: 0 to +60°C commercial grade -40 to +85°C industrial grade Storage: -40 to +85°C
Humidity	Operating: 10 - 90 % r. H. non cond. Storage: 5 - 95 % r. H. non cond.



* Additional Operating Systems on request

COM Express®

conga-TS87

- 4th Gen. Intel® Core™ Processor
- Up to quad core 3.7 GHz
- Patented cooling solutions for max. use of Intel® Turbo Boost 2

conga-TS87

	conga-TFS	NEW conga-TS87	conga-TS77	conga-TM67	conga-TS67
Formfactor	COM Express® Basic, (95 x 125 mm²), Type 6 Connector Layout				
CPU	AMD Embedded R-464L, 4x 2.3 GHz AMD Embedded R-460H, 4x 1.9 GHz AMD Embedded R-272F, 2x 2.7 GHz	Intel® Core™ i7-4700EQ, 4x 2.4 / 3.7 GHz Intel® Core™ i5-4400E 2x 2.7 / 3.3 GHzT Intel® Core™ i5-4402E 2x 1.6 / 2.7 GHz Intel® Core™ i3-4100E 2x 2.4 GHz Intel® Core™ i3-4102E 2x 1.6 GHz Intel® Core™ i7-4850EQ 4x 1.6 / 3.20 GHz (Product with limited long term availability)	Intel® Celeron® 847E, 2x 1.1 GHz Intel® Celeron® 827E, 1x 1.4 GHz Intel® Celeron® 927UE, 1x 1.5 GHz Intel® Celeron® 1020E, 2x 2.2 GHz Intel® Celeron® 1047UE, 2x 1.4 GHz Intel® Core™ i7-3615QE, 4x 2.3 GHz Intel® Core™ i7-3612QE, 4x 2.1 GHz Intel® Core™ i7-3555LE, 2x 2.5 GHz Intel® Core™ i7-3517UE, 2x 1.7 GHz Intel® Core™ i5-3610ME, 2x 2.7 GHz Intel® Core™ i3-3120ME, 2x 2.4 GHz Intel® Core™ i3-3217UE, 2x 1.6 GHz	Intel® Core™ i7-2710QE, 4 x 2.1 GHz Intel® Core™ i5-2510E, 2 x 2.5 GHz Intel® Core™ i3-2330E, 2 x 2.2 GHz Intel® Celeron® B810, 2 x 1.6 GHz	Intel® Celeron® 807UE, 1.0 GHz Intel® Celeron® 827E,1.4 GHz Intel® Celeron® 847E, 2x 1.1 GHz Intel® Celeron® B810E, 2x 1.6 GHz Intel® Core™ i3-2340UE, 2x 1.3 GHz Intel® Core™ i7-2610UE, 2x 1.5 GHz Intel® Core™ i7-2655LE, 2x 2.2 GHz
DRAM	max. 16 GByte DDR3 1600 MHz	max. 16 GByte DDR3L 1600 MHz	max. 16 GByte DDR3 1600 MHz		
Chipset	AMD A70M	Intel® QM87	Intel® QM77	Intel® QM67 / Intel® HM65 (Intel® Celeron® version)	
Ethernet	Realtek RTL8111GN GbE LAN Controller	Intel® I217-LM GbE LAN Controller with AMT 9.0 support	Intel® 82579 GbE LAN Controller with AMT 8.0 support	Intel® 82579 GbE LAN Controller with AMT 7.0 support	
I/O Interface Serial ATA	4x	4x	4x	4x	4x
PCI EXPRESS®	7x	7x	7x	7x	7x
PEG	1x	1x 3.0	1x	1x	1x
USB 3.0	4x	4x	4x	-	-
USB 2.0	8x	8x	8x	8x	8x
Express Card®	2x	2x	2x	2x	2x
Sound	Digital High Definition Audio Interface				
Graphics	AMD Radeon™ HD 7000G Graphics supporting DirectX® 11, OpenGL 4.2 and OpenCL™ 1.1	Intel® HD Graphics 4600 up to Intel® Iris™ Pro graphics 5200	OpenCL™ 1.1, OpenGL 3.1 and DirectX® 11 support	Intel® Flexible Display Interface (FDI), OpenGL 3.0 and DirectX® 10.1 support	
Video Interface	LVDS 2x 24 bit, analog VGA				
	-	-	1x DisplayPort / HDMI / SDVO		
	3x DisplayPort/HDMI		2x DisplayPort/HDMI		
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 2.x firmware				
Security	All congatec COM Express® Basic boards can be optionally equipped with a 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 3.0 with battery support	ACPI 4.0 with battery support			
Operating Systems*	Microsoft® Windows 8, Microsoft® Windows 7, Linux, Microsoft® Windows® embedded Standard				
	Microsoft® Windows XP	-	Microsoft® Windows XP		
Power Consumption typ.	Processor TDP: 35 W	Processor TDP: 25 .. 47 W	Processor TDP: 17 .. 45 W	Processor TDP: 35 .. 45 W	Processor TDP: 17 .. 25 W
Temperature	Operating: 0 .. +60°C		Storage: -20 .. +80°C		
Humidity	Operating: 10 - 90 % r. H. non cond.		Storage: 5 - 95 % r. H. non cond.		

* Additional Operating Systems on request

COM Express®

conga-TCA3

- Based on 3rd Generation Intel® Atom™ Processor
- Up to 4 Cores / 2.0 GHz
- Up to 8 GByte RAM

conga-TCA3

	NEW conga-TCA3	NEW conga-TC87	conga-TCG	conga-TCA
Formfactor	COM Express® Compact, (95 x 95 mm²), Type 6 Connector Layout			
CPU	Intel® Celeron® J1900 4x 2.0 GHz Intel® Celeron® N2930 4x 1.83 GHz Intel® Celeron® N2807 1x 1.58 GHz Intel® Atom™ E3845 4x 1.91GHz Intel® Atom™ E3827 2x 1.75GHz Intel® Atom™ E3826 2x 1.46GHz Intel® Atom™ E3825 2x 1.33GHz Intel® Atom™ E3815 1.46GHz	Intel® Core™ i7-4650U 2x 1.7 / 3.3 GHz Intel® Core™ i5-4300U 2x 1.9 / 2.9 GHz Intel® Core™ i3-4010U 2x 1.7 GHz Intel® Celeron® 2980U 2x 1.6 GHz	Embedded G-Series Processors AMD GX-420CA SoC, 4x 2.0 GHz AMD GX-415GA SoC, 4x 1.5 GHz AMD GX-217GA SoC, 2x 1.65 GHz AMD GX-210HA SoC, 2x 1.0 GHz	Intel® Atom™ D2550 2x 1.86 GHz Intel® Atom™ N2800 2x 1.86 GHz Intel® Atom™ N2600 2x 1.6 GHz
DRAM	max. 8 GByte DDR3L 1333MHz	max. 16 GByte DDR3L 1600 MHz	max. 8 GByte DDR3L ECC 1600 MHz	max. 4 GByte DDR3 1066 MHz
Chipset	Integrated in SoC	Intel® QM87	Integrated in SoC	Intel® NM 10
Ethernet	Intel® I210 Gigabit Ethernet	Intel® I217-LM GbE LAN Controller with AMT 9.5 support	GBE	GBE Realtek 8111E
I/O Interface Serial ATA	-	4x	2x	2x
PCI EXPRESS®	5x	4x	4x	5x
PEG	-	-	-	-
USB 3.0 (optional)	1x	2x	2x	2x
USB 2.0	8x	8x	8x	8x
Express Card®	-	2x	2x	2x
Sound	Digital High Definition Audio Interface			
Graphics	Intel® HD Graphics	up to Intel® HD graphics 5000	AMD Radeon™ HD 8000E Graphics supporting DirectX® 11.1, OpenGL 4.2 and OpenCL™ 1.2	OpenGL 3.0 and DirectX® 9 support
Video Interface	LVDS 2x 24 bit	LVDS 2x 24 bit	LVDS 2x 24 bit, VGA	LVDS 1x 24 bit
	2x DisplayPort/HDMI	3x DisplayPort/HDMI	1x DisplayPort/HDMI	2x DisplayPort/HDMI
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 2.x firmware, 8 MByte serial SPI firmware flash			AMI Aptio® UEFI 2.x firmware, 4 MByte serial SPI firmware flash
Security	All congatec COM Express® Compact boards can be optionally equipped with a 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 5.0 with battery support	ACPI 4.0 with battery support Ultra low standby power	ACPI 3.0 with battery support	
Operating Systems*	Microsoft® Windows7 Embedded Standard, Linux, Windows® Embedded Compact 7			
	Microsoft® Windows Embedded Standard 8			Microsoft® Windows XP, Windows® CE 6.0
Power Consumption typ.	Processor TDP: tbd	Processor TDP: 11.5 .. 15W	Processor TDP: 9.0 .. 25W	Processor TDP: 3.5 .. 10W
	see manual for full details, CMOS Battery Backup			
Temperature	Operating: 0 .. +60°C Storage: -20 .. +80°C			
Power Management	Operating: 10 - 90 % r. H. non cond. Storage: 5 - 95 % r. H. non cond.			

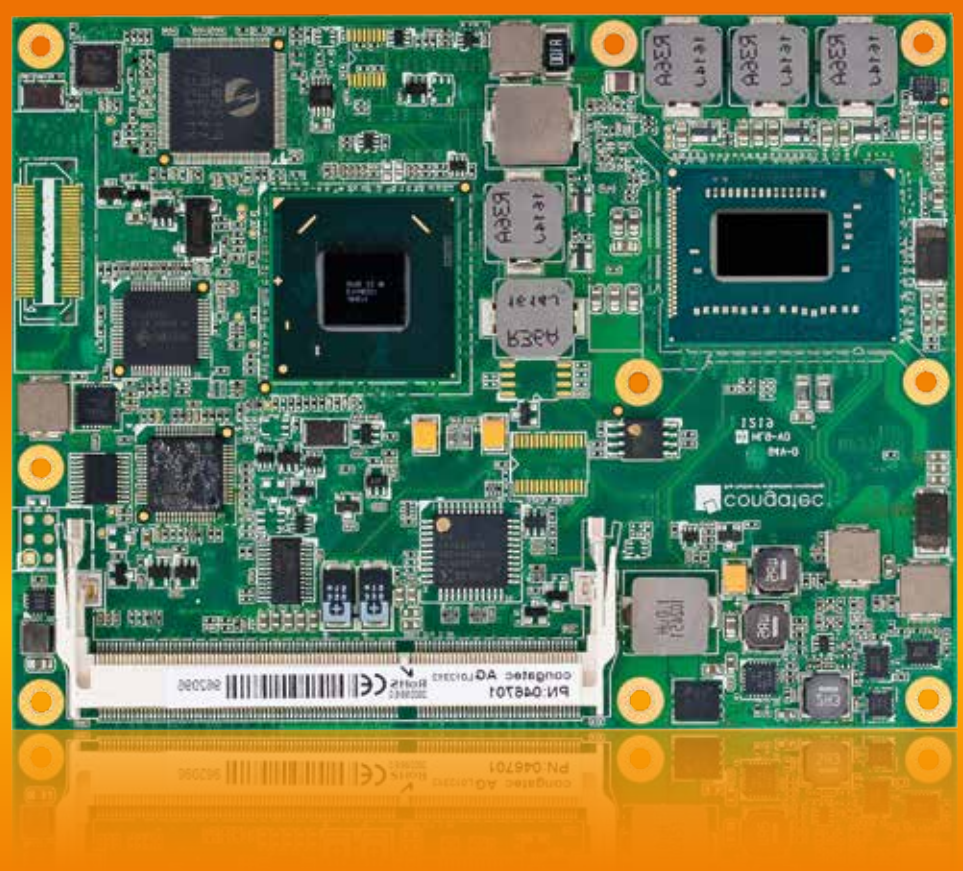
* Additional Operating Systems on request

COM Express® Type 2 Basic – Product Overview

COM Express®

conga-BS77

- COM Express® Type 2 Module
- Up to 3rd Gen. Intel® Core™ i7 Processor 4x 3.3 GHz
- Congatec patented cooling for maximum use of Intel® Turbo Boost



conga-BS77

	conga-BP77	conga-BS77	conga-BM67/conga-BS67	conga-BM57/conga-BS57
Formfactor	COM Express® Basic, (95 x 125 mm²), Type II connector layout			
CPU	Intel® Core™ i7-3612QE 4x 2.1/3.1 GHz Intel® Core™ i7-3555LE 2x 2.5/3.2 GHz Intel® Core™ i7-3517UE 2x 1.7/2.8 GHz Intel® Core™ i5-3610ME 2x 2.7/3.3 GHz Intel® Core™ i3-3120ME 2x 2.4 GHz	Intel® Core™ i7-3615QE 4x 2.3/3.3 GHz Intel® Core™ i7-3612QE 4x 2.1/3.1 GHz Intel® Core™ i7-3555LE 2x 2.5/3.2 GHz Intel® Core™ i7-3517UE 2x 1.7/2.8 GHz Intel® Core™ i5-3610ME 2x 2.7/3.3 GHz Intel® Core™ i3-3120ME 2x 2.4 GHz Intel® Core™ i3-3217UE 2x 1.6 GHz Intel® Celeron® 927UE, 1x 1.5 GHz Intel® Celeron® 1020E, 2x 2.2 GHz Intel® Celeron® 1047UE, 2x 1.4 GHz	conga-BM67: Intel® Core™ i7-2710QE, 4x 2.1/3.0 GHz Intel® Core™ i5 -2510E, 2x 2.5/3.1 GHz Intel® Core™ i3-2330E, 2x 2.2 GHz Intel® Celeron® B810, 2x 1.6 GHz conga-BS67: Intel® Core™ i7-2655LE, 2.2/2.9 GHz Intel® Core™ i7-2610UE, 1.5/2.4 GHz Intel® Core™ i3-2340UE, 1.3 GHz Intel® Celeron® 847E, 1.1 GHz Intel® Celeron® 827E, 1.4 GHz	conga-BM57: Intel® Core™ i7-620M, 2x 2.66/3.33 GHz Intel® Core™ i5-520M, 2x 2.4/2.93 GHz Intel® Celeron® P4500, 2x 1.86 GHz conga-BS57: Intel® Core™ i7-620LE, 2x 2.0/2.8 GHz Intel® Core™ i7-620UE, 2x 1.06/2.13 GHz Intel® Core™ i3-330E, 2x 2.13 GHz Intel® Celeron® U3405, 2x 1.07 GHz
DRAM	max. 16 GByte DDR3 1600 MHz		max. 16 GByte DDR3 1333 MHz	max. 8 GByte DDR3 1333 MHz
Chipset	Intel® QM77		Intel® QM67 / Intel® HM65 (Intel® Celeron® version)	Intel® HM55
Ethernet	Intel® 82579 GbE		Intel® 82579 GbE LAN Controller with AMT 7.0 support	Intel® 82577LM Ethernet PHY
I/O Interface **Serial ATA**	4x	4x	4x	3x
PCI EXPRESS®	6x	6x	6x	5x
PEG	1x	-	-	-
USB 2.0	8x	8x	8x	8x
Express Card®	-	-	2x	2x
EIDE	1x	1x	1x	1x
Sound	Digital High Definition Audio Interface			
Graphics	Intel® HD Graphics 4000		Intel® HD Graphics / Intel® HD Graphics 3000	Mobile Intel® 5 Series HD Graphics
Video Interface	LVDS 2x24 bit, analog VGA			
	-	1x Display Port / HDMI / SDVO		
	-	2x Display Port/HDMI		
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 2.x firmware, 8 MByte serial SPI firmware flash			AMI Aptio® UEFI 2.x firmware, 4 MByte serial SPI firmware flash
Security	All congatec COM Express® Basic boards can be optionally equipped with a 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 3.0 with battery support			
Operating Systems*	Microsoft® Windows Embedded Standard 8, Microsoft® Windows Embedded Standard 7, Microsoft® Windows XP, Linux			
Power Consumption typ.	Processor TDP: 17 .. 25 W		Processor TDP: 17 .. 45 W	Processor TDP: 17...35 W
	see user's guide for full details, CMOS Battery Backup			
Temperature	Operating: 0 .. +60°C		Storage: -20 .. +80°C	
Humidity	Operating: 10 - 90 % r. H. non cond.		Storage: 5 - 95 % r. H. non cond.	

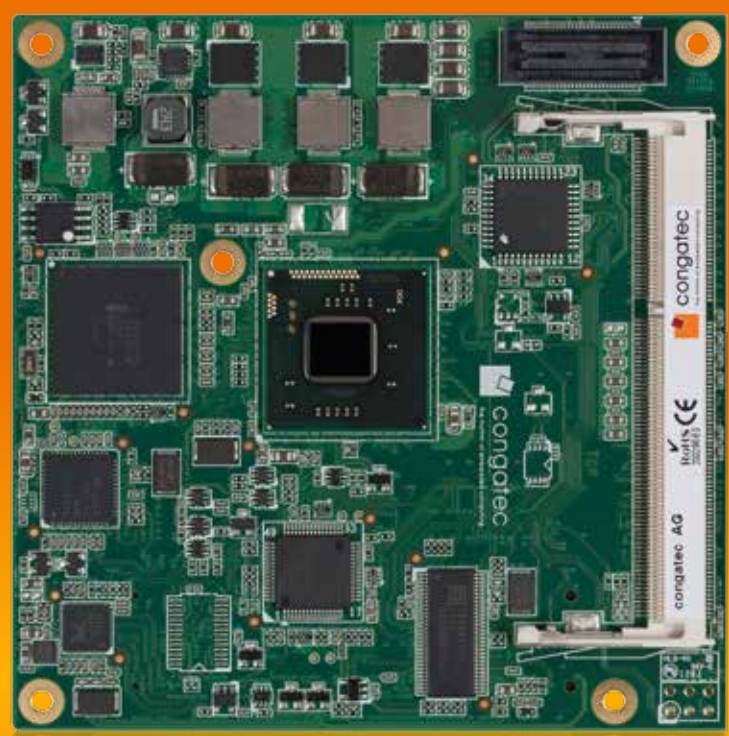
* Additional Operating Systems on request

COM Express® Type 2 Basic/Compact – Product Overview

COM Express®

conga-CCA

- COM Express® Type 2 Module
- Low power dual core Intel® Atom®Processor
- 3.5 Watt processor TDP
  for 2x 1.6 GHz performance



conga-CCA

	conga-BAF
Formfactor	COM Express® Basic, (95 x 125 mm²), Type II connector layout
CPU	Embedded G-Series Processors AMD G-T56N, 2x 1.6 GHz AMD G-T40N, 2x 1.0 GHz AMD G-T44R, 1.2 GHz AMD G-T40R, 1.0 GHz AMD G-T40E, 2x 1.0 GHz
DRAM	max. 8 GByte DDR3 1066 MHz
Chipset	AMD A55E Controller Hub
Ethernet	Realtek RTL8111E
I/O Interface Serial ATA	4x
PCI EXPRESS®	6x
USB 2.0	8x
Express Card®	2x
EIDE	1x
Sound	Digital High Definition Audio Interface
Graphics	Integrated High Performance Video
Video Interface	LVDS 2x 24 bit, analog VGA, 1x Display Port / HDMI / SDVO 2x Display Port/HDMI
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	All congatec COM Express® Basic boards can be optionally equipped with a 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 3.0 with battery support
Operating Systems*	Microsoft® Windows Embedded Standard 8, Microsoft® Windows Embedded Standard 7, Microsoft® Windows XP, Linux, Microsoft® Windows® CE 6.0, Windows® Embedded Compact 7
Power Consumption typ.	Processor TDP: 5.5 .. 18 W
	see user's guide for full details, CMOS Battery Backup
Temperature	Operating: 0 .. +60°C Storage: -20 .. +80°C
Humidity	Operating: 10 - 90 % r. H. non cond. Storage: 5 - 95 % r. H. non cond.

* Additional Operating Systems on request

	conga-CCA	conga-CA6
Formfactor	COM Express® Compact, (95 x 95 mm²), Type II connector layout	
CPU	Intel® Atom™ D2550 2x 1.86 GHz Intel® Atom™ N2800 2x 1.86 GHz Intel® Atom™ N2600 2x 1.6 GHz	Intel® Atom™ E680T / E680, 1.6 GHz Intel® Atom™ E660T / E660, 1.3 GHz Intel® Atom™ E640T / E640, 1.0 GHz Intel® Atom™ E620T / E620, 600 MHz
DRAM	max. 4 GByte DDR3 1066 MHz	max. 2 GByte DDR2 667/800 MHz
Chipset	Intel® NM 10	Intel® Platform Controller Hub EG20T
Ethernet	GBE Realtek 8111E	Micrel Gbit Ethernet Phy KSZ9021RN
I/O Interface Serial ATA	2x	2x
PCI EXPRESS®	4x	2x
PEG	-	-
USB 2.0	8x	6x
Express Card®	2x	-
EIDE	1x	1x (optional)
Sound	Digital High Definition Audio Interface	
Graphics	OpenGL 3.0 and DirectX® 9 support	Intel® Graphics Core
Video Interface	LVDS 2x 24 bit	LVDS 1x 24 bit
	1x Display Port HDMI SDVO	1x SDVO
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 2.x firmware, 4 MByte serial SPI firmware flash	-
Security	All congatec COM Express® Compact boards can be optionally equipped with a 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 3.0 with battery support	ACPI 3.0 with battery support
Operating Systems*	Microsoft® Windows Embedded Standard 7, Microsoft® Windows XP, Microsoft® Windows® Embedded Compact 7, Microsoft® Windows CE 6.0, Linux	
Power Consumption typ.	Processor TDP: 3.5 .. 10 W	tbd
	see user's guide for full details, CMOS Battery Backup	
Temperature	Operating: 0 .. +60°C Storage: -20 .. +80°C	per.: 0 .. +60°C (opt. -40 to +85°C) Storage: -20 .. +80°C (opt. -40 to +85°C)
Humidity	Operating: 10 - 90 % r. H. non cond. Storage: 5 - 95 % r. H. non cond.	

COM Express®

conga-MCB|COM Express Mini Carrier Board

Full featured carrier board for COM Express® Compact Type 2.

- 1x miniPCI Express Socket
- 1x RJ45 connector with integrated Gigabit Ethernet Transformer
- 1x CFAST Socket, 2x SATA, 1x 4 bit SD Card Socket
- 2x USB at the front panel, 4x USB pin header
- On board PC speaker, Line Out, Mic In at front panel
- 1x Display Port from DDI port C and 1x HDMI from SDVO port B
- LVDS interface (EPI - Embedded Panel Interface) 40 pin 1 mm 2 rows box header
- Backlight connector, 4 pin 2.00 mm box header
- On board lithium battery for CMOS backup and real time clock
- All signals for ACPI battery support (conga-SBMC^3) at the feature connector
- 5 pin Micro-Fit Power Connector, 3 pin Fan header, 12 V, tacho signal
- Size 145 x 95 mm

conga-CEVAL

Evaluation carrier board for COM Express® Type 2 modules

To achieve a quick start with COM Express® congatec offers an evaluation carrier board, which routes all the COM Express® signals to standard interface connectors. Supports COM Express® Compact and Basic modules using connector Pinout Type 2.

- 4x1 PCI Express®, 1x Express Card, 1x 16 PCI Express® Graphics (PEG), 1x Mini PCI Express® Card, 4x 32 bit PCI
- Gigabit Ethernet
- 6x USB
- HDA compatible codec
- AC97 optional via connector
- 4x SATA, 1x PATA
- 2x COM, 1x LPT, 1x Floppy, PS2 kbd./mouse
  PCI/LPC Postcode display
  System speaker, Power button, Reset button, CMOS Battery
- CRT connector, LVDS interface

conga-TEVAL

Evaluation carrier board for COM Express® Type 6 modules.

To achieve a quick start with COM Express® congatec offers an evaluation carrier board, which routes all the COM Express® signals to standard interface connectors. Supports COM Express® Compact and Basic modules using connector Pinout Type 6.

- 6x1 PCI Express®, 1x Express Card, 1x 16 PCI Express® Graphics (PEG), 1x Mini PCI Express® Card
- Gigabit Ethernet
- 6x USB
- 2x COM, 1x LPT, 1x GPIO/SDIO, LPC Postcode display
  System speaker, Power button, Reset button, CMOS Battery
- CRT connector, LVDS interface

COM Express®

conga-CKIT

This complete kit provides the ability to start evaluating COM Express® modules immediately.

- conga-CEVAL evaluation carrier board
- conga-Cdebug Post-Code and debug card with cables
- conga-FPA2 flat panel adapter with cables
- HDA (High Definition Audio) adapter card
- Dual DVI-D ADD2 card
- ATX power supply with cables
- USB Memory Stick
- Cable set for IDE, SATA

conga-Cdebug

COM Express® Debug Platform. The conga-Cdebug provides a debug platform for your application specific carrier board. Simply use it as a transparent debug interface between your carrier board and the COM Express® module.

- Postcode display for LPC or PCI
- LPC Firmware Hub Flash (FWH)
- 2x SATA connector
- Power connector for carrier board independent operation
- VGA
- 2x USB
- Power and reset switch
- LED`s: 4x GPIO status , 4x Command Byte Enable (CBE=PCI bus activity)
- Size 95 x 95 mm

COM Express®

conga-FPA2

Universal flat panel adapter board that has been designed to be EPI (Embedded Panel Interface) compliant. It can be used for either prototyping, demonstration purposes, or for debugging certain issues. It may also serve as a reference for the implementation of panel adaptations on customer specific carrier boards.

- Multiple I/O Combinations
- LVDS to TTL
- 18 and 24 Bit single-pixel support
- Configuration Memory
  EPI compliant EEPROM for custom panel settings
- Power Management
  All typ. supply voltages selectable
- Fully s/w controlled power sequencing
- Backlight Connector: Supports most backlight converters
- Software controlled brightness adjustment

SMART Battery Manager Module

conga-SBM³ is a complete battery manager sub system. It is designed for the use with low power congatec COM Express® compact modules and congatec Qseven® modules.

- Supports battery two smart batteries with configurations 2S up to 4S
- Dual charge and discharge for high efficiency
- S3 (Suspend to RAM) / S5 (Soft-Off) support
- Zero current from batteries in off mode
- LEDs provide a direct view of charging and battery capacity status
- Input voltage of 8 - 30V DC, with input power delimitation
- Output 12V / ~35W, 5V / ~20W
- Battery charging max. 4A or 2x 2A in dual charge mode
- Temperature: Operating: 0 .. +70°C, Storage: -25 .. +80°C

COM Express®

conga-HDMI / DisplayPort adapter

Add2 Card for DisplayPort
The conga-ADD2DP provides two DisplayPort and two HDMI interfaces

conga-LDVI

DVI Converter Module for LVDS. Compact module to convert LVDS to DVI-D. It can be used with either Express®, Qseven®, XTX™ or ETX® modules. It`s now possible to realize a dual port DVI-D system independent of the typical Video Output Ports (SDVO or DVO).

COM Express®

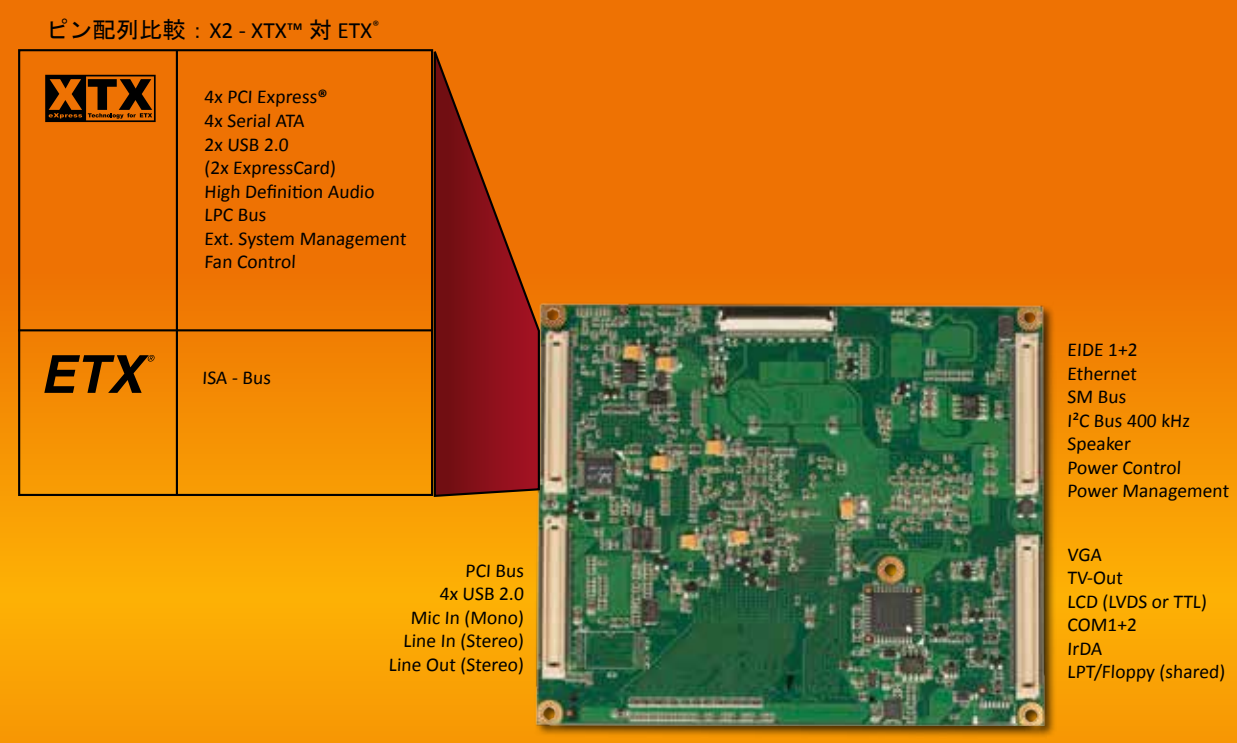
Single DVI-D ADD2 Card

ADD2 display adapter card with single DVI-D digital output. Suitable for all Intel® based platforms that support Serial Digital Display Outputs (SDVO) on the standard x16 PCI Express® Graphics (PEG) port.

Dual DVI-D ADD2 Card

ADD2 display adapter card with dual independent DVI-D output. Suitable for all Intel® based platforms that support Serial Digital Display Outputs (SDVO) on the standard x16 PCI Express® Graphics (PEG) port.

XTX™ – the Concept



XTX™ is an expansion and continuation of the well established and highly successful ETX® standard. XTX™ offers the latest I/O technologies on this proven form factor. Modern embedded applications rarely use the ISA bus and XTX™ implements the PCI Express® bus on the X2 connector, thus guaranteeing longevity for XTX™.

XTX™ – Advantages

PCI Express®
In addition to the 32 bit parallel PCI bus, XTX™ offers 4 PCI Express® lanes. This allows the customer to equip their embedded PC application with next generation of PC performance. PCI Express® is a low pin count interface with maximum bandwidth per pin.

Serial ATA Interfaces (SATA)
SATA is an enhancement of the parallel ATA therefore offering higher performance. As a result of this enhancement the traditional restrictions of parallel ATA are overcome with respect to speed and EMI.

High Speed USB
XTX™ offers two additional USB 2.0 ports thereby increasing the total amount of USB ports available to 6.

Backwards Compatible to ETX®
XTX™ is 100 % backwards compatible to the ETX® standard. Most customer specific carrier boards will not require a redesign in order to use congatec's XTX™ modules. The ISA bus can be implemented through the use of a PCI-ISA bridge on the customer specific carrier board. As an alternative to this the customer can use the readily available XTX™ LPC bus.

LPC Bus
As a replacement to the no longer supported ISA bus, XTX™ offers the LPC (Low Pin Count) bus. The LPC bus corresponds approximately to a serialized ISA bus yet with a significantly reduced number of signals.

Identical Mechanics to ETX®
The size (95x114 mm), the mounting, the height, the connectors and the heatspreader are exactly the same as defined in the ETX® specification. Existing ETX® solutions can easily switch to the innovative XTX™ platform without any mechanical change.

Upgrade to XTX™
Applications which do not utilize the ISA bus can directly upgrade to XTX™ modules. The signals at connectors X1, X3 and X4 are equal to ETX®. Only the signals at the X2 connector have been redefined in order to support PCI Express®, SATA, LPC and more. Existing ETX® carrier boards can easily be upgraded to take advantage of these new and fast interfaces.

The ETX® standard

ETX® was one of the very first Computer-On-Module concepts ever. It was defined in 1998 by JUMPtec as an open standard. ETX® is a well established and highly successful standard. It offers most standard PC I/O's on a compact form factor. ETX® is the best module standard when legacy interfaces i.e. ISA are required.

XTX ETX®

XTX™ Modules

- Enhanced lifetime for ETX®
- Featuring PCI Express® and SATA
- High scalability
- ETX® compatible, no ISA Bus

conga-XAF

	conga-XAF	conga-XLX
Formfactor	ETX® Spec 2.7. without ISA Support, XTX™ Extensions, 95 x 114 mm²	
CPU	Embedded G-Series Processors AMD G-T56N, 2x 1.6 GHz AMD G-T52R, 1x 1.5 GHz AMD G-T40R, 1x 1.0 GHz AMD G-T40E, 2x 1.0 GHz	AMD Geode™ LX 800, 500 MHz
DRAM	max. 4 GByte DDR3 1066 MHz	max. 1 GByte DDR333
Chipset	AMD A55E Controller Hub	AMD Geode™ CS5536
Ethernet	Realtek RTL8105E	IEEE 802.3u 100Base-Tx, Fast Ethernet compatible
I/O Interface Serial ATA	4x	2x
PCI EXPRESS®	4x	-
USB 2.0	6x	4x
Express Card®	2x	-
EIDE	2x	2x
Sound	Digital High Definition Audio Interface with support for multiple audio codecs	AC'97 digital audio interface
Graphics	Integrated High Performance Video	Integrated in chipset
Video Interface	VGA	
	LVDS 2x 24 bit	LVDS 1x 18 bit
	1x DisplayPort/HDMI	-
congatec Board Controller	Multi Stage Watchdog, Non-volatile User Data Storage, Manufacturing and Board information, Board Statistics, BIOS Setup, Data Backup, I²C (Fast Mode, 400 kHz, Multi Master), Power Loss Control	
Embedded BIOS Feature	AMI-Aptio UEFI BIOS	OEM Logo, OEM CMOS Defaults, LCD Control, (Auto Detection, Backlight Control), Flash Update, Based on Insyde XpressROM
Security	This congatec XTX™ modules can be optionally equipped with a discrete „Trusted Platform Module" (TPM).	-
Power Management	ACPI 3.0 with Battery support	ACPI 2.0 with Battery support
Operating Systems*	Microsoft® Windows 8, Microsoft® Windows 7, Windows Embedded Compact 7	-
	Microsoft® Windows XP, Microsoft® Windows CE 6.0, Microsoft® Windows® embedded Standard, Linux	
Power Consumption typ.	Processor TDP: 9 .. 18 W	< 5W
	see user's guide for full details, CMOS Battery Backup	
Temperature	Operating: 0 .. +60°C	Storage: -20 .. +80°C
Humidity	Operating: 10 - 90 % r. H. non cond.	Storage: 5 - 95 % r. H. non cond.

* Additional Operating Systems on request

	conga-EAF	conga-ELX	conga-ELXeco
Formfactor	ETX® Spec 3.02, 95 x 114 mm	ETX® Spec 2.7, 95 x 114 mm	
CPU	Embedded G-Series Processors AMD G-T56N, 2x1.6 GHz AMD G-T40N, 2x1.0 GHz AMD G-T40R, 1x1.0 GHz AMD G-T40E, 2x1.0 GHz AMD G-T16R, 1x 615 MHz	AMD Geode™ LX 800, 500 MHz	
DRAM	up to one 4 Gbyte DDR3 1066 MHz	up to 1 Gbyte DDR333	On board 256 MB
Chipset	AMD A55E Controller Hub	AMD Geode™ CS5536	
Ethernet	Realtek RTL8105E	IEEE 802.3u 100Base-Tx, Fast Ethernet compatible	
I/O Interface Serial ATA	2x	-	
EIDE	2x (UDMA-66/100)	1x (UDMA-66/100)	1x (UDMA-33)
USB 2.0	4x	4x	4x
Compact Flash®	-	1x	1x
PCI Bus	✓	✓	✓
Sound	High Definition Audio Interface	AC'97 Rev.2.2 compatible, Line In, Line Out, Mic In	
Graphics	Integrated High Performance Video	Integrated in chipset up to 254 MByte graphic memory (UMA)	
Video Interface	LVDS 2x24 bit, VGA	LVDS 1x18 bit, VGA	
	DisplayPort/HDMI	-	
congatec Board Controller	Multi Stage Watchdog, Non-volatile User Data Storage, Manufacturing and Board information, Board Statistics, BIOS Setup, Data Backup, I²C (Fast Mode, 400 kHz, Multi Master), Power Loss Control		
Embedded BIOS Feature	AMI-Aptio UEFI BIOS	OEM Logo, OEM CMOS Defaults, LCD Control (Auto Detection, Backlight Control), Flash Update, Based on Insyde XpressROM	
Power Management	ACPI 3.0 with battery support	APM 1.2	
Operating Systems*	Microsoft® Windows8, Microsoft® Windows7, Windows Embedded Compact 7	-	
	Microsoft® Windows CE 6.0, Microsoft® Windows XP, Microsoft® Windows® embedded Standard, Linux		
Power Consumption typ.	Processor TDP: 9 .. 18 W	<5 W	<5 W
	see user's guide for full details, CMOS Battery Backup		
Temperature	Operating: 0 .. +60°C, Storage: -20 .. +80°C		
Humidity	Operating: 10 - 90 % r. H. non cond., Storage: 5 - 95 % r. H. non cond.		

congatec
the rhythm of embedded computing

Find more in depth information at: www.congatec.com

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- All users manuals
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- Drivers and board support packages for all major operating systems
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www.congatec.com

Headquarters:

congatec AG

Auwiesenstraße 5
94469 Deggendorf,
Germany

Phone +49 (991) 2700-0
Fax +49 (991) 2700-111

info@congatec.com
www.congatec.com

Subsidiaries:

congatec Asia Ltd.

14F-5, No. 270, Sec 4,
Zhongxiao E. Rd.
106 Taipei City, Taiwan

Phone +886 2 2775 4645
Fax +886 2 2775 3263

sales-asia@congatec.com
www.congatec.tw

congatec, Inc.

6262 Ferris Square
San Diego
CA 92121 USA

Phone +1 858-457-2600
Fax +1 858-457-2602

sales-us@congatec.com
www.congatec.us

congatec China Technology Ltc.

Sunyoung Center, 901 Building B,
No. 28 Xuanhua Road, Changning District,
Shanghai 200050, China

Phone +86 2160255862
Fax +86 2160256561

sales-asia@congatec.com
www.congatec.cn

congatec Australia Pty Ltd.

Unit 3, 92 Township Drive
West Burleigh
Queensland 4219, Australia

Phone +61 755200841
Fax +61 755201578

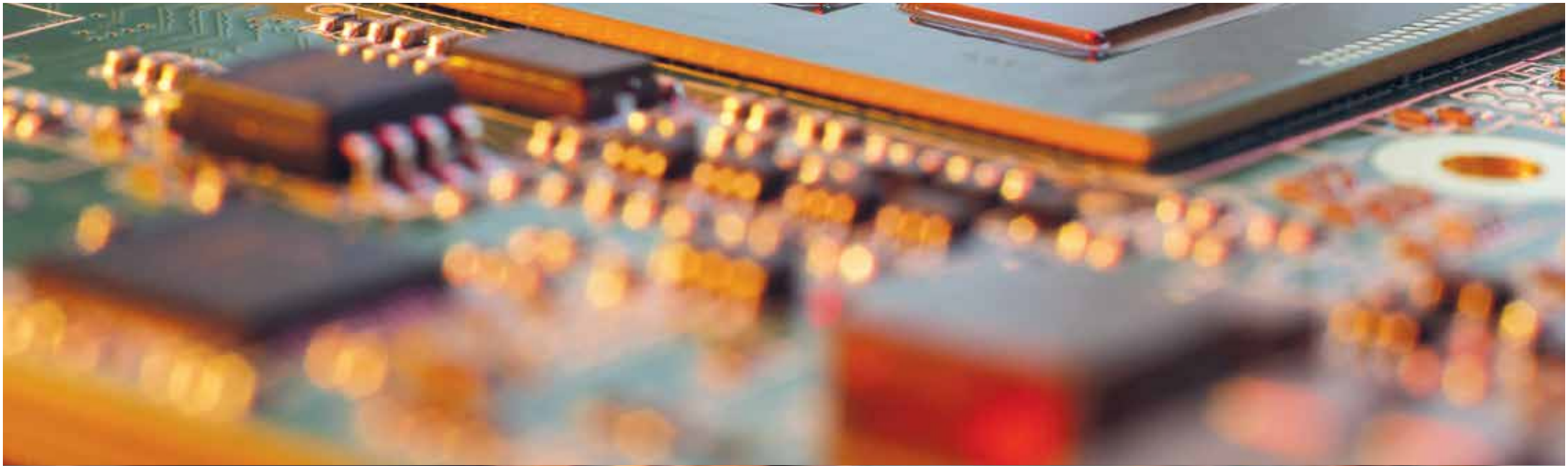
sales-au@congatec.com
www.congatec.com.au

congatec Japan K.K.

Shiodome building 301,
Minato-ku Hamamatsucho 1-2-7
105-0013 Tokyo-to, Japan

Phone +81 3 6435 9250
Fax +81 3 6435 9251

sales-jp@congatec.com
www.congatec.jp

congatec s.r.o.

Zahradnicka 6
603 00 Brno
Czech Republic