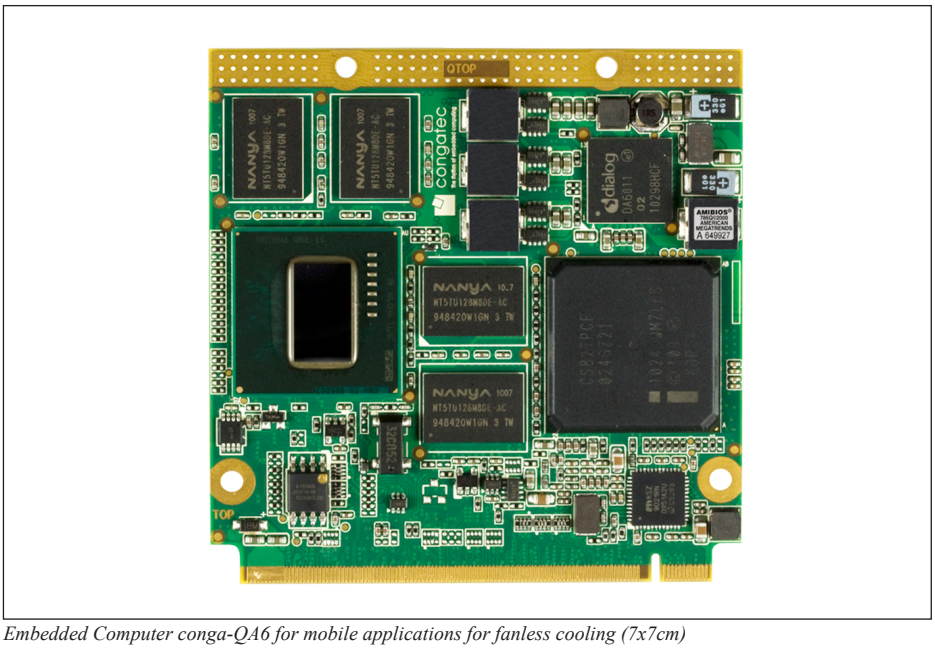
congatec

FlowCAD

Embedded Computer



Embedded Computer conga-QA6 for mobile applications for fanless cooling (7x7cm)

Qseven Embedded Computer

The Qseven® standard was adopted by the Standardization Group for Embedded Technologies e.V. (SGeT). Qseven is an off-the-shelf, Computer-On-Module that integrates all the core components of a common PC and is mounted onto one square PCB. Based on this standard congatec developed an ultra-compact, legacy-free multi-platform-embedded computer for mobile and ultra-mobile applications with unique thermal interface optimized tight integrations with fanless cooling. This module is suited for applications with a need for graphics, sound, mass storage, network and multiple USB ports.

The dimensions and the pinout of the high-speed MXM system connector are standardized to carry all the I/O signals to and from the Qseven module. Typical applications for Qseven modules are low cost and low power mobile devices. Especially the small form factor of 70 x 70 mm (2¾" x 2¾") is important for embedded applications. The standardized size and MXM connector pinout allow plug compatible solution of scalable performance class Qseven modules.

The conga-QA6 might have up to 2 GByte onboard DDR2 memory with 667/800 MT/s. For flexibility and many different applications the QA6 has to have many interfaces like eight USB 2.0; two SATA (AHCI only); one SDIO; three PCIexpress; one I²C Bus; one USB client; one LPC bus; and one CAN Bus.

Even an optional onboard SATA Solid State Drive with up to 32 GByte is available. For motion video support two independent displays are supported by a single channel 80MHz LVDS transmitter is implemented on the PCB to display information on flat panels with 1x18 and 1x24 bit data mapping up to a resolution of 1280x768@60Hz.

These technical specifications allow a versatile usage in many mobile applications. The regular operating temperature is from 0°C to +60°C but (opt. -40 to +85°C). But for special applications a temperature range from.

The conga-QA6 is based on the Qseven mobile standard and is equipped with the new Intel® Atom™ processor E6xx series as well as the Intel® platform controller hub EG20T. All components of this design are specified for an industrial temperature range of -40°C to +85°C. It has a typical power consumption of <5 watts, is barely larger than a credit card and has integrated functions for battery and ACPI 3.0 power management.

Headquarters of congatec AG in Deggendorf

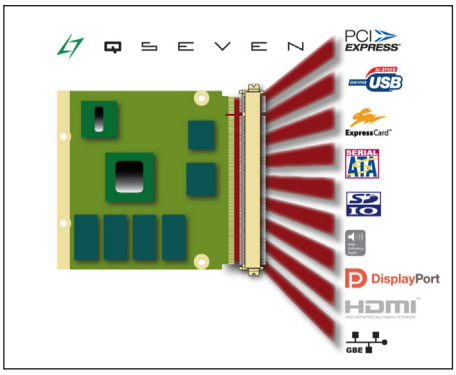
Carsten Rebmann, R&D Manager

Design Challenges

"In the competitive market of computer on modules based on a public available standard we have to have highest quality and performance products to be successful. An extreme high yield and short design cycles are essential for us to have a profitable business. So we must ensure that all the complex design rules for many different IO ports are managed by the design software in a central Constraint Manager and provide immediate online DRCs when something is violating the rules." said Carsten Rebmann R&D Director at congatec AG. "A fast and predictable time to market is only possible when you can design your products reliable and efficient."

One critical area of a Qseven is the small MXM edge connector. All IO ports for the protocols like PCIexpress, SATA and USB 2.0 are transferred through this single connector. This requires not only a fine pitch layout for the connecting tracks, but also length and impedance rules to stay within the limits for crosstalk, signal integrity and power integrity.

This design uses many different high-speed interfaces, this requires to apply many complex design rules. There are small tolerances for impedance of transmission lines and for the length of the individual traces. Some interfaces require that all traces match the same length within 1 mm. Allegro PCB Editor and the integrated online Constraint Manager helps to tune the length of tracks interactively while checking the maximum allowed crosstalk between the individual signals.



conga-QA6

Most high-speed interfaces utilize serial links for data transmission. These transmission lines are implemented as differential pairs. The challenge is to get all differential pairs right from the timing and make both signals on each track in the same phase. Allegro PCB Editor helps with its static and dynamic phase control to implement the serial links and beat the limits for signal integrity. This will result in a more robust design quality.

Allegro PCB Editor not only helps with high speed-signals. To improve the power system the track width of a power supply should be as wide as possible. But when you route under the component there might be only a smaller track width possible. In the Constraint Manager you can specify different settings for track width for under a component or in open space. These settings make it easy for the designer to vary the width for track to find an optimal compromise between available space and maximum of power stability.

Tools used to design

Congatec uses Allegro PCB Designer and the Allegro High-Speed Option for High-Speed digital signals on the board. The design rules are imported as technology files into Allegro's Constraint Manager for the whole design and are verified online while routing the PCB.

Member of Consortium

Congatec is a founding member of the SGeT e.V. consortium.

About congatec AG

congatec AG has its head office in Deggendorf, Germany and is a leading supplier of industrial computer modules using the standard form factors Qseven, COM Express, XTX and ETX, as well as Single Board Computers (SBC) and EDM services. congatec's products can be used in a wide variety of industries and applications, such as industrial automation, medical technology, automotive supplies, aerospace and transportation.
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