



Designing mini x86 devices efficiently

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With Pico-ITX, small form factor (SFF) designers can gain from a standard solution, with which they can develop the smallest embedded devices fast and without having to make user-specific adaptations. There are, however, alternatives.

Increasingly, developers of small form factor devices are looking for off-the-shelf products that minimise development costs and time, consequently guaranteeing fast time-to-market. With the new 2.5-in Pico-ITX form factor, a mini single board computer form factor has become available that enables immediate application.

For the first time, individual developments on such a small form factor (10 x 7.2 cm or 72 cm²) are no longer compulsory.

To the embedded computer technology market, characterised by the need for long-term availability, Pico-ITX offers independent support via SFF-SIG. In terms of hardware, the Pico-ITX form factor is equipped, for example, with Atom processors and the highly integrated system controller hub in the smallest of spaces.

To exploit the full potential of the Atom processors, the most crucial thing was to find a balance between embedded connectors and interfaces available on the enclosure.

Due to these reasons, for example, on the Kontron Pico-ITX SBC pITX-SP Gbit ethernet, 2 x USB 2.0 and DVI are placed externally, as these are the interfaces which are in most common use in applications. Further interfaces are provided via embedded connectors.

It's quite astounding to see what can be achieved there.

In spite of the fact that the Pico-ITX form factor is no larger than the connector panel of an ATX conform motherboard (160 mm x 45 mm = 72 cm²), the new embedded motherboard offers room for 1 DDR2 SoDIMM module, four further USB 2.0 interfaces, up to 2 x SATA II,

1 x PATA44 and a socket for microSD cards along with a Jili30 LVDS interface for simple monitor connection.

Additionally, a backlight inverter can be connected and controlled. Audio devices can be connected via line in, line out, MIC in and SPDIF out to the integrated HDA controller. User-specific extensions are possible via 1 x SDIO (secure digital input/output) pin header or digital IO (4-bit).

The 2.5-in form factor is suitable for combining congruent 2.5-in hard disks in a space-saving way. System designs including CPU heat sinks with about 10 mm in height can be integrated into a construction of around 40 mm.

Without a heat sink and with a micro SD card instead of a 2.5-in hard disk, the result is even flatter.

Depending on the solution required, a standard board doesn't always fit the bill. With the COM Express compatible computer-on-modules form factor nanoETXexpress (55 x 84 mm = 46 cm²),

compact solutions similar to Pico-ITX can be developed.

However, the concepts of both solutions meet different requirements.

With COMs, for example, it is possible to implement any external interfaces which are required and this — from a certain production quantity — can have a positive effect on costs.

This is realised on a user-specific carrierboard which is fitted directly into the enclosure. Cables are not necessary. A Pico-ITX board can do without this design effort, if existing interfaces suit the requirements. So both solutions are targeting different fields of application.

In this class of small boards, computer-on-modules is gaining significance as, for example, user-specific interfaces connected via PCIe in small spaces are more and more in demand. For this reason, it is important to choose the right COM.

Market researcher VDC has already announced its prognosis that promises best growth rates for nanoETXexpress: COM Express computer-on-modules (COMs) with COM Express Type 1 connectors will achieve an annual growth rate of 70% and attain a market share of 21% in 2010.

This confirms the high acceptance of the credit card-sized form factor nanoETXexpress, as this computer-on-module form factor is the most dominant representative of its class.

Hence, it is not surprising that Aeon, Adlink and Advantech have joined this specification and have — together with Kontron — passed revision 1.0 of the nanoETXexpress specification, which now also supports SDVO.

Together with the PICMG consortium they will jointly present the nanoETXexpress form factor under the proposed neutral name of 'Ultra', so that it can be included in the next COM Express specifications.

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Revision 1.0 of the nanoETXexpress computer-on-modules specification sees, by the way, SDVO becoming available via a separate flat foil connector. This enables continued LVDS support via the COM Express connector and DVI can still be used, which gives the green light for solutions with two independent monitors.

Revision 1.0 of the nanoETXexpress specification is available for downloading at: <http://www.nanoetxexpress.com/>.

When larger production quantities are required, employing individual semi- and full-custom single board solutions is recommendable. Companies like Kontron also offer — along with a wide range of standard COTS products — original design and manufacturing (ODM) services for tailor-made platform solutions.

Instead of splitting different stages of development and/or production of embedded computer technology between several partners, OEMs can switch to just one ODM service provider and in doing so profit from a higher level project efficiency with simpler, overall management.

Assuming that in the past, in-house projects and new custom designs were essentially a matter of large production quantities, not every company comes into question as a partner for ODM outsourcing projects.

A certain size and financial strength of the potential ODM service provider are important factors which serve to guarantee long-term availability and competitiveness. Additionally, an extensive standard product portfolio can have cost-saving effects, as the ODM company has already carried out designs for its own range, and these can be easily transferred to customer-specific products.

Inexpensive purchasing is also guaranteed due to scaling effects, as the ODM service provider has purchased according to his own needs and quantities are consequently larger. Manufacturers that can provide a large product range are also in a much better position to balance out up- and downturns in demand.

The choice of ODM partner therefore should fall on a manufacturer of embedded computer technology, which ideally would

have its own production facility in Asia, to ensure production costs keep to a minimum.

A further real benefit is the fact that the ODM project manager liaises and coordinates all aspects of the project locally with the user, meaning that the user will be spared any control and coordination work regarding the Asian manufacturing and moreover released from any possible risks connected with this.

Beside the importance of the hardware portfolio, software is increasingly becoming a competitive and differentiation feature, so the software range of the ODM service provider should be considered. The more dedicated software an ODM offers for its embedded solutions, the better it will fit into the particular application in question.

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The compact alternative: nanoETXexpress

Demand for smaller form factors is not only met with SBCs but also via established COM Express specifications of the PICMG. A turnover over \$74m should be achieved in 2010 with these COM Express modules.

The smallest form factor with a COM Express compatible connector is the credit card-sized nanoETXexpress form factor (55 x 84 mm = 46 cm²).

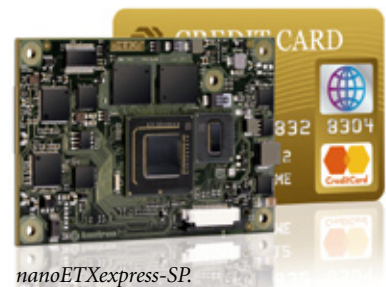
COM designs with nanoETXexpress bring the benefits of especially small enclosures and energy-efficient designs and are therefore suitable for small form factor (SFF) and ultra-mobile devices.

For applications that require more graphic performance and a wider range of interfaces, COMs in the microETXexpress format (95 x 95 mm = 90.25 cm²) are the answer.

Boards with this form factor support include, for example, high 3D graphic performance and dual-display support via SDVO, LVDS, VGA and TV-out.

Depending on the application, all COM modules are easily interchangeable. The precondition for this is the use of Type 1 or Type 2 COM Express connectors, which VDC sees in a leading position within the COM Express conform modules (93% in 2010) and consequently as the de facto standard.

Therefore, alternative modules should only be used, if no satisfactory technical solution can be found with COM Express, as the significance and the long-term availability of alternative modules concepts are in no way guaranteed.



nanoETXexpress-SP.



SBC in 2.5-in format: Kontron pITX-SP.