COM-HPC Mini – maximum performance on a mini form factor

The new high-end PICMG standard for credit-card-sized Computer-on-Modules

COM-HPC Mini is a new upcoming Computer-on-Module standard currently in development at PICMG with the aim to deliver the smallest high-performance standardized module currently possible. It follows the highly successful COM-HPC Client and Server standards that are specifically designed to deliver extreme computing performance and interface bandwidth to demanding edge applications. COM-HPC Mini is now set to bring these features to Small Form Factor (SFF) designs. It is positioned on top of comparable SFF standards, such as COM Express Mini, and provides future oriented applications that face space constraints and power limitations with an unprecedented level of IO and computing power.

The features at a glance
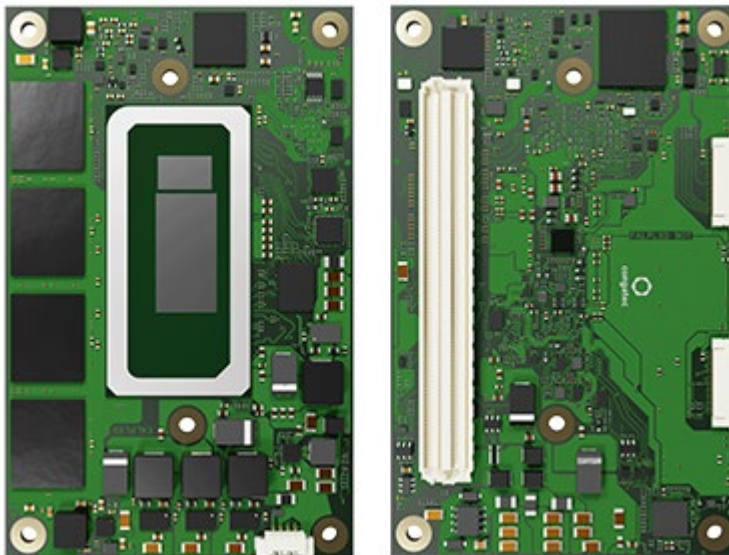
Small Form Factor (SFF) dimension

Based on the COM-HPC Client specification and measuring just 95 mm x 60 mm, COM-HPC Mini has half the footprint of COM-HPC Client Size A. As such COM-HPC Mini extends the usage model of COM-HPC Client to applications that previously

could not been addressed due to size restrictions. Minimizing the for factor required slight changes to the interfacing, so COM-HPC Mini modules are not compatible to the Client and Server specifications. The most significant change is the use of just one high-speed connector instead of two. This connector also comes with a different pinout to provide an optimized feature set. So, with 400 signal pins, COM-HPC Mini can transfer the full range of latest high-bandwidth interfaces – including fully featured USB 4.0, Thunderbolt, PCIe Gen4/5 as well as 10 Gbit/s Ethernet and much more.

Targeting high-performance designs

Compared to COM-HPC Client, the specified maximum heat dissipation of the Mini standard is also reduced. Yet the maximum power consumption of up to 76 Watts offers ample headroom for performance-oriented processors. This enables COM-HPC Mini to provide SFF designs with unprecedented performance levels as delivered by the latest multicore processor technologies. A good example are Intel Core processors, which will become a natural choice for this new form factor.

Rugged by design

Another change affects the overall construction height of the module and heatspreader design, which is now 5 mm lower. Consequently, module and heatspreader require only 15 mm above the carrier surface instead of 20 mm as with the other COM-HPC specifications. This allows for very slim designs as required in mobile handheld devices or panel PCs. In order to stay within the height limit, COM-HPC Mini modules require soldered memory. This makes COM-HPC Mini modules rugged by design, as soldered memory not only provides high resistance against shock and vibrations but also efficient cooling thanks to direct thermal coupling to the heatspreader.

The interfaces at a glance

COM-HPC Mini

- 16x PCIe^3 with Target Support
- 4x USB 4.0^1
- 4x USB 3.2x1^1 / 2x USB 3.2 x1^1
- 8x USB 2.0^2
- 2x SATA^3
- 12x GPIO, 2x UART, 1x CAN
- eSPI, 2x SPI, SMB, 2x I2C
- 2x MIPI-CSI^4
- HDA/I2S, 2x SoundWire
- FuSa
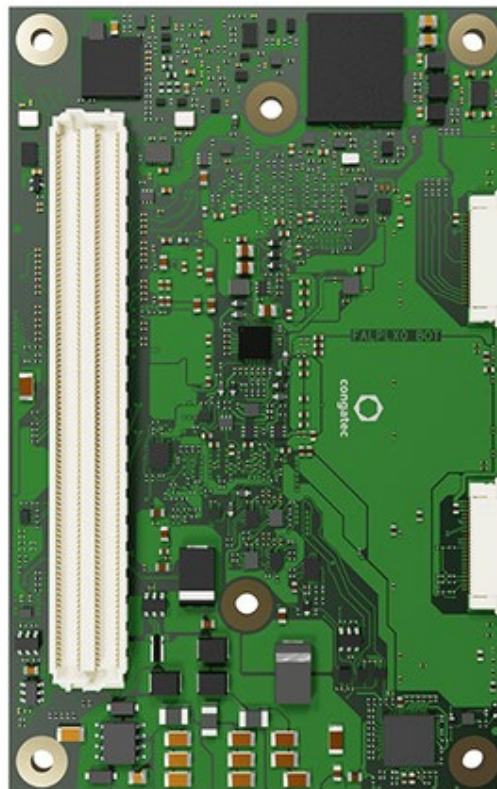- 2x NBaseT, 2x NBaseT Serdes^3
- 2x DDI^1, 1x eDP
- Power 8-20V DC

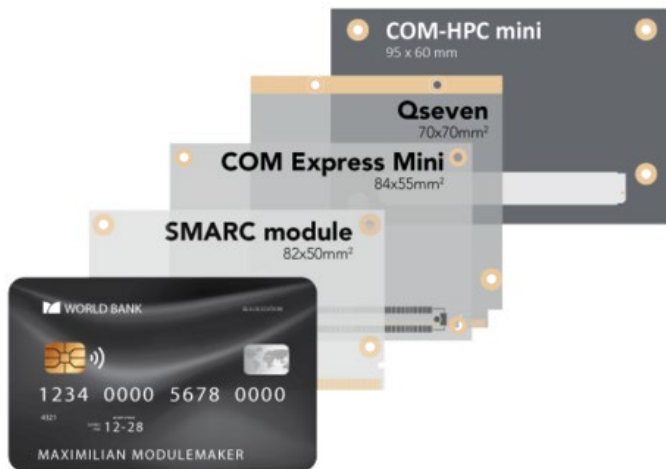[1] Alternative use for DDI or USB 3.x possible
[2] Also needed for USB4 and USB 3.2
[3] Alternative to PCIe Lanes
[4] 2x Flatfoil Connector

COM-HPC Mini in comparison to other SFF sizes

The COM-HPC Mini ecosystem

When the PICMG COM-HPC technical subcommittee approved the COM-HPC Mini pinout at the end of 2022, an essential milestone within the specification process was reached. With the pinout ratification in place, carrier board designers and Computer-on-Module manufacturers who are active in the COM-HPC working group have since embarked on first module and development carrier board designs so that developers can already start with application evaluation and development and switch to fully compliant components as soon as the specification will be published. The final ratification of the COM-HPC Mini standard is scheduled for the first half of 2023.