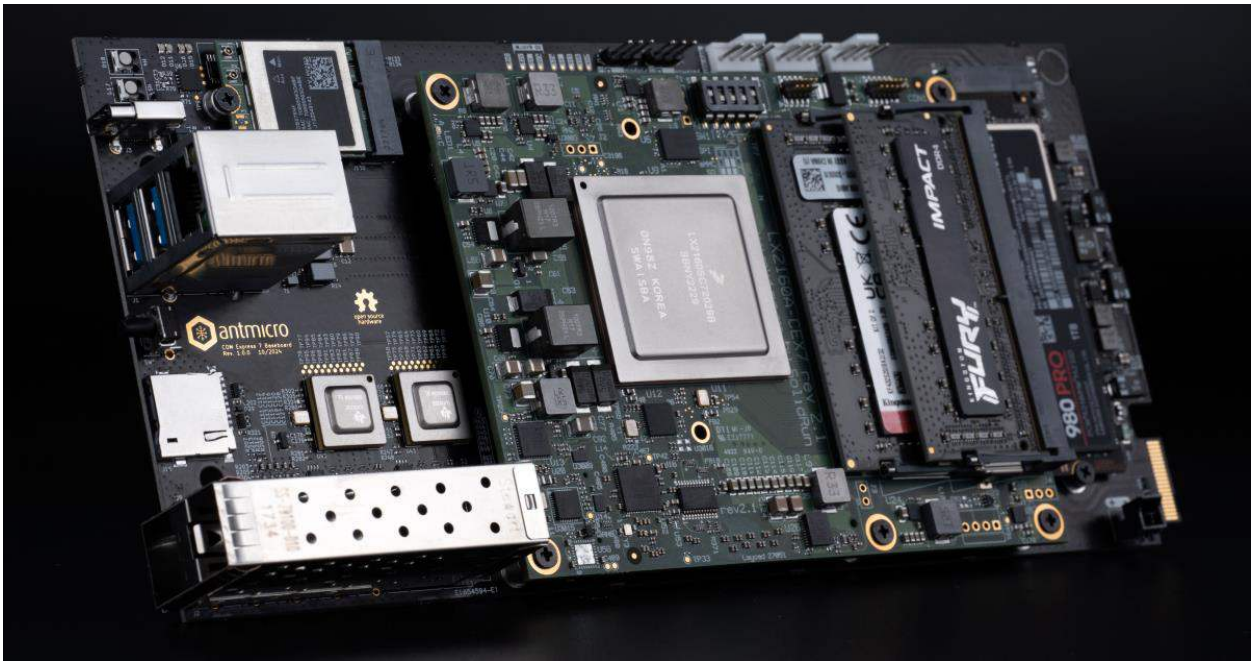
Open Source COM Express Baseboard for Type 7 Basic Modules

The COM Express specification provides an open industry standard for Computer-On-Modules designed for high-end, specialized use cases. In particular, COM Express Type 7 is dedicated for data processing applications that require high computing density and high I/O throughput.

This article presents Antmicro's newly developed open hardware baseboard for COM Express Type 7 modules in the basic (95×125mm) form factor, suitable for size constrained devices in distributed computing clusters. It complements their portfolio of open-source distributed compute systems which already includes the open source GPU cluster and the Scalerunner compute cluster, enabling high-performance CPU applications through compatibility with many-core Layerscape® CPU modules such as our LX2160A COM Express Type 7.



The open-source board can serve as a reference design for creating custom high-end industrial, medical or scientific research devices. The compact design also makes it ideal as a starting point for larger parallel computing setups, hardware-in-the-loop testing, CI runners etc. Antmicro offers commercial engineering services to create customized variants of the board (e.g. in terms of I/Os) and can provide tailored software including BSPs, OTA update and device fleet management solutions, and more.

High Density Compute

The COM Express Type 7 Baseboard is targeted towards applications that require both lots of compute power offered by SoCs like the **Layerscape** and high throughput connectivity, featuring two SFP+ 10G Ethernet ports, two USB 3.0 type A ports and a Gigabit RJ45 connector. The baseboard exposes two M.2 key M (PCIe x4/NVMe) slots for accelerators, storage or additional connectivity as well as an OCuLink PCIe x4 connector which makes it possible to connect external PCIe devices. The baseboard is also expandable with modules like accelerators, analog front-end instrumentation or FPGAs that can be connected via a backplane edge connector exposing a PCIe bus.

https://www.solid-run.com/wp-content/uploads/2025/01/COM-Express_device_assembly.mp4

The baseboard has been designed to integrate with both x86 (e.g. AMD Ryzen) and ARM architecture SoMs, making it ideal for testing software compatibility at scale across a wide range of CPUs in server setups. Our design should be compatible with any COM Express 7 module, including our **LX2160A** which uses the NXP Layerscape CEx7 LX2160A SoC offering 16x ARM Cortex-A72 cores at up to 2.2 GHz. This ARM CPU, along with a maximum of 64GB DDR4 memory installed on the LX2160A, enables native software compilation and testing, and offers lower levels of power consumption when compared to x86 CPUs while taking full advantage of the networking enabled by the COM Express Baseboard.

The ARM-based SolidRun LX2160A Computer-on-Module the baseboard used as a reference design can be exchanged for alternative modules depending on specific use cases. To learn more about the internals and the design of the COM Express Baseboard, check out Antmicro's Open Hardware Portal.

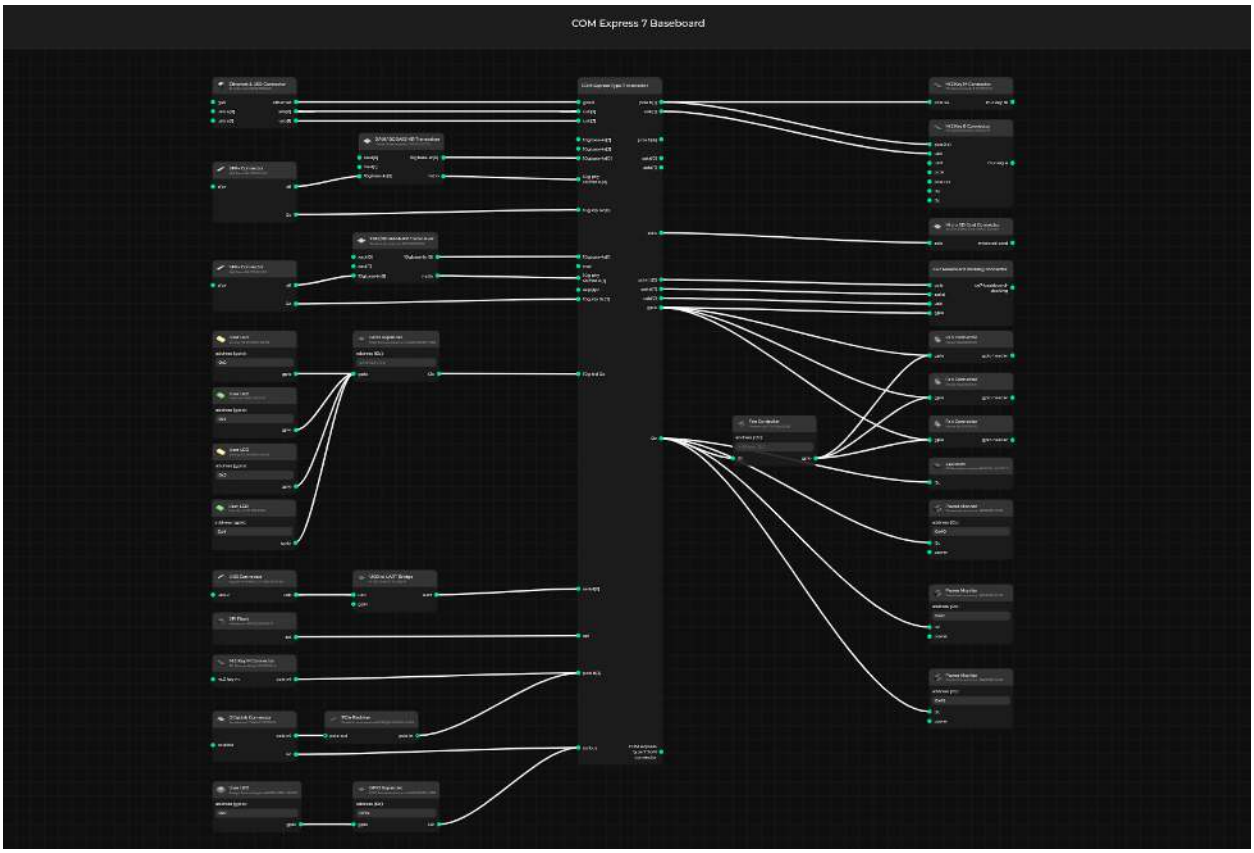
Options to Cluster, Miniaturize and Expand

Designed with modularity in mind, the **COM Express** Baseboard can also be placed in an enclosure for use in data centers or other distributed multi-node computing systems. To enable compatibility with other standardized rack mounting systems such as 19" rack cabinets, Antmicro developed custom

enclosures used in their own server rooms, and mechanical design and integration of complex systems is also a service we provide.

https://www.solid-run.com/wp-content/uploads/2025/01/COM-Express_server_room_animation.mp4

Antmicro's COM Express Baseboard joins the long list of their fully customizable technology demonstrators and can be further miniaturized or ruggedized for use in space-constrained and harsh environments. The board is featured in Antmicro's System Designer portal, where you can find 3D renders with interactive components, a detailed list of components, and an autogenerated HBOM. Below, you can find a block diagram of the baseboard.



Modular, Open Source Hardware Design for Demanding Applications

As flexibility is at the core of Antmicro's design philosophy, they offer comprehensive end-to-end integration services around the COM Express family for a variety of use cases and industries, including life sciences, space and industrial automation. Combining that with their comprehensive software services based on a breadth of open source tools and frameworks we are developing, Antmicro can

help you rapidly develop your next product featuring the compute power of a 16-core Cortex-A72 in a small footprint.

If you would like to find out more about Antmicro's engineering services, and how they can assist with creating customized hardware for your advanced use cases, take a look at their Open Hardware Portal with a constantly expanding database of hardware components and get in touch at: contact@antmicro.com.

About SolidRun

SolidRun is a global leading developer of embedded systems and network solutions, focused on a wide range of energy-efficient, powerful, and flexible products. Our innovative compact embedded solutions are based on Arm and x86 architecture and offer a variety of platforms including SOMs (System-on-Module), SBCs (Single Board Computer) and industrial mini-PCs.

SolidRun offers a one-stop-shop for developers and OEMs, providing a complete service from hardware customization to software support and even product branding and enclosure design. With a mission to simplify application development while overcoming deployment challenges, SolidRun proudly provides customers with faster time-to-market and lower costs.

About Antmicro

Antmicro is a technology company providing tools and engineering services for fast-turnaround development of specialized software and hardware, FPGA and ASIC designs, cloud solutions and AI for industries including semiconductors, automotive, robotics, defense, space and consumer electronics. Antmicro's open source workflows and toolchains enable customizability and transparency and drive vertical integration through complete ownership of the technology stack.

The company's technologies cover the full product development lifecycle from concept, simulation and prototyping to product development and in-field deployment. They include the flagship open source system simulation framework, Renode (renode.io), the RDFM OTA update system (github.com/antmicro/rdfm), the Kenning AI library (github.com/antmicro/kenning), and the System Designer product development toolkit (designer.antmicro.com).

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