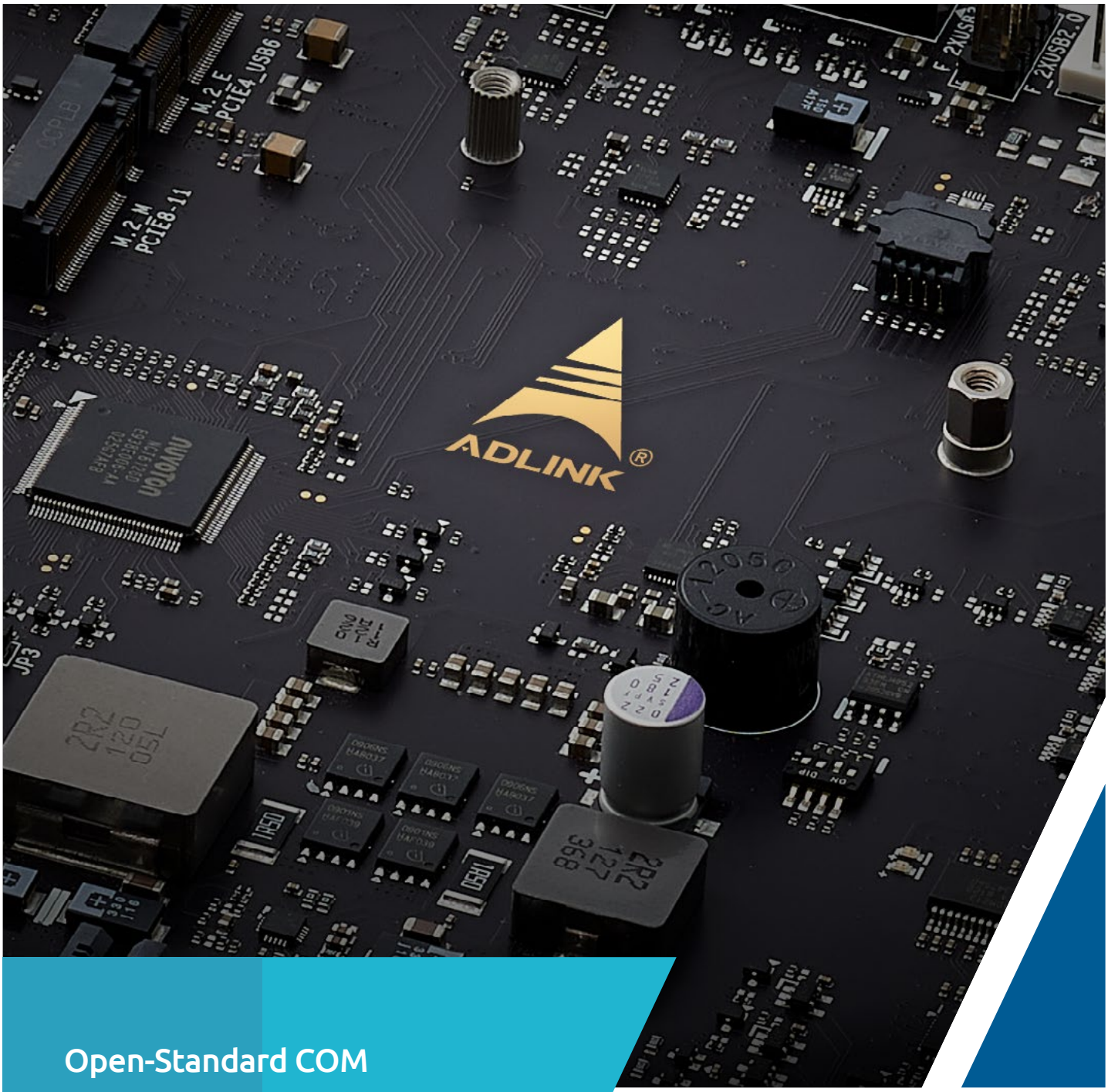
ADLINK
LEADING EDGE COMPUTING



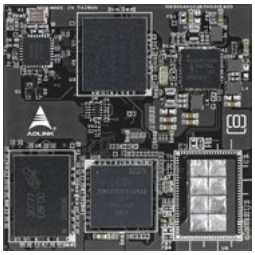
Open-Standard COM Specification Selection Guide

COM-HPC™ | COM Express | SMARC module | OPEN STANDARD MODULE™ | SEVEN | ETX®

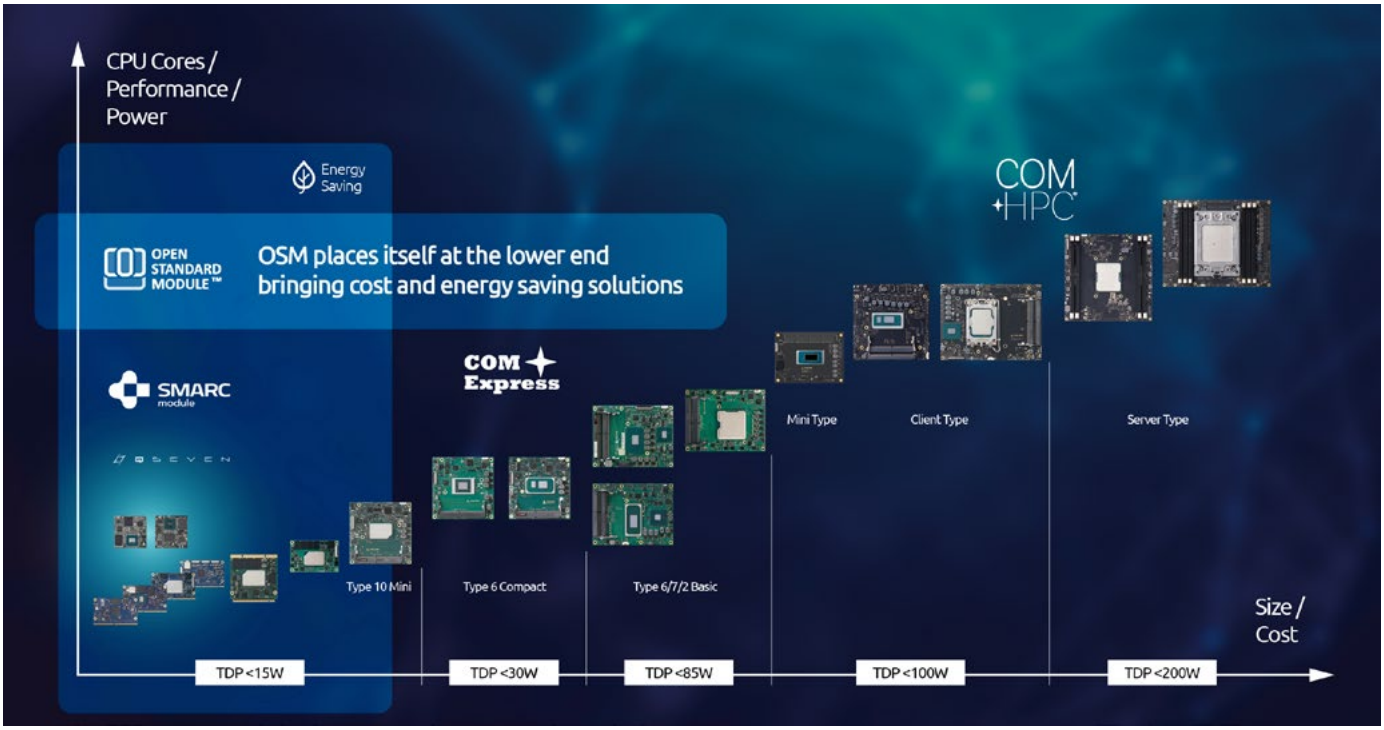
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With the recent introduction of the SGeT Open Standard Module (OSM), engineers have access to a range of modular computing standards that scale from low-power, deeply embedded devices through server-class computing solutions.

As a supplier of OSM, Q7, SMARC, COM Express, and COM-HPC solutions, ADLINK is not only familiar with the details of each specification but also an active participant in the standards organizations that define these specifications. This quick reference guide is designed to help newcomers to the space get acquainted with two-board embedded hardware specifications.



ADLINK OSM-IMX93



At first glance, these specifications can all seem similar, requiring potential users to read through multiple specifications to determine the best fit for their use case. This is particularly true for the smallest modules, where there are several specifications with overlapping capabilities.

However, there are a few key data points that can reduce that evaluation and decision time dramatically. This guide highlights the distinguishing features of these miniaturized modules, such as available form factors, processor architectures, interfaces, and power budgets. It also points out the significant differences between OSM and other small compute modules.

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	OSM Size-L	Q7	SMARC	COM Express Mini	COM-HPC Mini
Size	45x45mm	70x70mm	82x50mm	84x55mm	95x70mm
Pins	662	230	314	220	400
Processor Options	MCU, Arm, RISC-V, x86	Arm, x86	Arm, x86	x86	x86, Arm, FPGA, GPU
Max. Power	42.5W	12W	15W	20W	45W
Target Applications	Deeply embedded, IoT, Edge	IoT, Industrial	Industrial, Medical, HMI, IoT	Industrial, HMI, Medical, Transportation	Medical, T&M, Industrial, Defense, Transportation

COM/SiP Background

The computer-on-module (COM) concept uses a two-board architecture that pairs a pre-built compute module with a custom carrier board joined together through a pluggable connector. This architectural approach has numerous benefits, including reducing development time and costs, avoiding lock-in with a multi-vendor platform, and providing a straightforward path for product upgrades or variants.

The system-in-package (SiP) takes this concept further with a more compact form factor and a more rugged, solderable BGA package. Thus, a SiP is more like a component than a board-level solution.

The main COM and SiP standards are maintained by two industry bodies. PICMG oversees the performance-oriented COM Express and COM-HPC specifications, while SGeT manages the efficiency-focused OSM, Q7, and SMARC specifications.

The following provides more details on these options.

OSM

OSM takes a SiP approach using a tightly integrated solderable BGA package instead of a pluggable card. This makes OSM modules ideal for deeply embedded IoT and edge computing applications where space is limited and reliability is critical.

As a SiP solution, OSM modules are more like components than board-level solutions. This means OSM modules can be used to create solutions similar to fully-custom single-board computers (SBCs) without the engineering investment SBCs usually require. Even better, when it comes time to create a new SBC, designers can reuse the OSM and the software developed for it rather than start from scratch.

OSM modules come in four sizes: OSM-Zero, OSM-S, OSM-M, and OSM-L. This guide focuses on OSM-L because its capabilities overlap with the other standards covered here. The other sizes go down to as small as 30 x 15 mm and focus on applications that can be served by 16- and 32-bit MCUs and application processors.

Despite its petite dimensions, OSM-L supports a thermal design power (TDP) of 42.5W—a power budget over two times larger than most small COM modules. OSM-L is also smaller than any COM, so it can pack an extraordinarily high level of performance into a small footprint.

It's important to note that OSM modules can support any processor architecture that fits within its footprint. Developers can access x86, RISC-V, and Arm solutions from NXP, Intel, MediaTek, Qualcomm, Texas Instruments, and more, giving developers more choice and flexibility in their designs.

What's more, the open-standard nature of OSMs promotes a broad ecosystem. Compatible modules are available from multiple vendors, helping mitigate the risk of supply chain disruptions and ensuring a longer product lifecycle. The standardized pin-out and interface specification allow developers to easily switch between different OSM vendors or upgrade to newer modules as technology advances, without requiring significant changes to the carrier board design. This modularity enables a more future-proof design approach and helps to protect the initial investment in custom hardware.

For a more comprehensive overview of the new SGeT OSM family of specifications, read "Open Standard Module (OSM): A Standardized System-in-Package for Embedded Systems."

Q7

Q7 is one of the smallest COM solutions, measuring 70x70mm. As an SGeT specification, it shares similarities with OSM, such as support for ARM and x86 processors and low power consumption. Q7 designs can be easily transferred to OSM, making it a good choice for IoT and industrial applications that may require future scalability.

SMARC

SMARC modules offer a balance between compact size (82x50mm) and performance, supporting both Arm and x86 processors with a power range of up to 15W. As an SGeT specification, SMARC designs can be easily transferred to OSM. SMARC is well-suited for industrial and medical applications that require more processing power than Q7 but still need to maintain a small footprint.

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■ COM Express Mini

COM Express Mini is part of the COM Express family of specifications, which has been widely deployed for years. COM Express Mini measures 84x55mm and supports x86 processors with a power range of up to 20W. The standard is known for its ability to withstand rugged environments and has a proven track record in applications with extreme demands like aerospace and defense. It also offers more PCIe lanes and display outputs compared to smaller form factors, making it a good fit for industrial and transportation applications that require higher performance and connectivity.

■ COM-HPC Mini

COM-HPC Mini belongs to the broader COM-HPC family, offering a unique blend of compact size and server-class computing capabilities for rugged applications. Despite being the largest in this comparison at 95x70mm, these modules are actually the smallest COM solution for high-performance computing in harsh environments. They support x86, Arm, FPGA, and GPU processors with a power range of up to 45W. They offer the most PCIe lanes, USB 3.0 ports, and on-board memory, making them suitable for demanding applications in telecommunications, networking, and server environments.

■ Adding Value to Your Embedded System Design

By partnering with an experienced solution provider like ADLINK, you can streamline your development process, reduce time-to-market, and focus on your core competencies and application-specific requirements.

One possibility is to use a pre-engineered board-level solution based on any of these specifications. This approach reduces initial development costs and accelerates time-to-market while retaining the option to move to a custom design for future products.

When the time comes for a custom design, ADLINK's carrier board design services can help you create a scalable solution that optimizes performance while minimizing development overhead. Additionally, partnering with ADLINK gives you access to manufacturing support, software/firmware integration services, and many other supporting services.

ADLINK offers a complete product portfolio that addresses a wide range of application requirements. This includes a full range of OSM, Q7, SMARC, COM Express, and COM-HPC modules, off-the-shelf SBCs, and a variety of pre-integrated IoT and edge computing solutions. Our commitment to technology roadmaps and ability to provide robust solutions makes us a trusted partner for embedded hardware solution developers.

■ Conclusion

When selecting hardware for embedded systems, developers have more choices than ever, each with its own strengths. Each COM standard has its advantages, but OSM offers unique benefits thanks to its SiP form factor. With its rugged solderable design, compact size, and pick-and-place machine compatibility, OSM can achieve many of the benefits of custom SBCs without a massive engineering investment.

Developers can enjoy those benefits and more by working with ADLINK to obtain complete, scalable pre-engineered board-level solutions and custom carrier boards to reduce their development costs, accelerate time-to-market, and maximize ROI.

To get started, view our product information or ask for a consultation.

To buy devkits, please visit ipi.wiki.

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