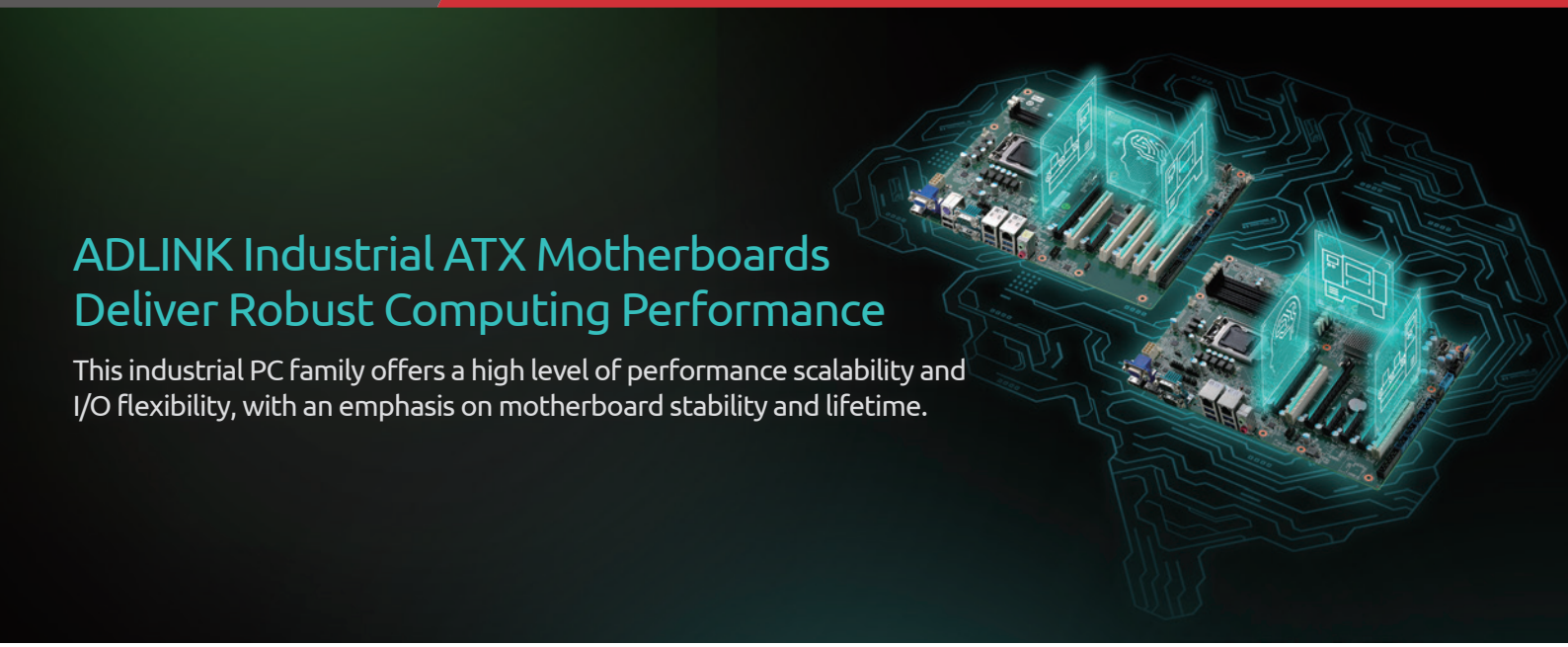
ADLINK
Leading EDGE COMPUTING

Solution Brief



ADLINK Industrial ATX Motherboards Deliver Robust Computing Performance

This industrial PC family offers a high level of performance scalability and I/O flexibility, with an emphasis on motherboard stability and lifetime.

Industrial AI Trends

"Embedded development platforms for artificial intelligence (AI) and machine learning are the latest trend sweeping the boards and systems markets," according to VDC Research.[1] For instance, machine makers and systems integrators are applying AI workloads to a wide range of inputs, like video, text, voice, images, and sensor data, with the goal of improving a system's decision making.

An AI-optimized industrial system will often employ heterogeneous computing, meaning it uses different types of computing cores, such as general-purpose CPUs, graphic processing units (GPUs), and field programmable gate arrays (FPGAs). Typically, one will start with an industrial PC (based on a general-purpose CPU) that supports other cores via add on cards, hopefully in a flexible and performance-maximizing way.

Selecting an ATX Motherboard for Industrial Applications

Commercial off-the-shelf (COTs) ATX motherboards are popular among industrial system developers because of their easy setup, the availability of compatible peripherals and enclosures, and fast time-to-market.

Although ATX is a standard form factor, there can be significant differences in the features and capabilities offered by different motherboard vendors. Looking beyond the ATX spec, developers of compute-heavy applications, like motion control, automated optical inspection, and AI, should consider a motherboard's range of performance. Since there will be a need to add PCI Express® (PCIe) cards and peripherals, I/O flexibility and I/O bandwidth provisioning are also particularly important.

Some industrial computing assets must operate for tens of years, so motherboard lifetime is a key selection criterion, as is a board's reliability and its ability to operate consistently in various configurations.

Why ADLINK Industrial ATX Motherboards

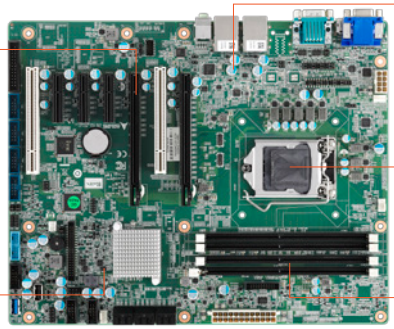
ADLINK has been developing industrial-grade systems for more than 25 years; and, reflecting the company's extensive design expertise, its industrial ATX motherboard family incorporates many advanced features and technologies, such as:

Intelligent PCIe land allocation

Use flexibile I/O to add high data-rate add-on cards (e.g. graphics, RAID, 10G LAN) as needed.

10dB less radition than Class A

Reduce system raditation (EMI)



ADLINK Industrial ATX Motherboards

Novel USB power design

Avoid USB device malfunction due to excessive power draw

Thermal- and power-optimized motherboard

Maximize computing performance in harsh environments

Triple-thick-gold-plated connectors

Benefit from improved connectivity, reliability and board lifetime

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Thermal- and power-optimized motherboard

The cost/performance/power requirements of industrial systems vary widely. ADLINK allows users to optimize their systems accordingly by supporting a very large number of desktop and server CPUs. ADLINK's industrial-grade thermal and power design maximizes computing performance by ensuring the CPUs will not need to slow down (i.e., CPU throttling) whenever the operating temperature is 60°C or less.

Intelligent PCIe lane allocation

Industrial systems typically deploy multiple PCI Express cards to support functions such as image capture, storage server, and networking. ADLINK industrial ATX motherboards have flexible I/O and automatically ensure each of the five available PCIe expansion slots receives the maximum possible data bandwidth for all configurations (e.g., one x16 card or two x8 cards) without the use of jumpers or bus settings.

Novel USB power design

In industrial PCs, USB ports are one of the most widely-used I/O ports, offering high-speed connectivity. However, utilizing multiple USB ports can lead to excessive power draw, which can overburden the power supply unit (PSU) and lead to a faulty condition. ADLINK's unique power plant design ensures USB ports receive a stable 5V +/- 5% no matter which PSU is used.

10 dB less radiation than Class A

Too much radiation noise generated by an ATX motherboard and add on cards could cause the system or instrument to become unstable. ADLINK industrial ATX motherboards radiate an exceptionally low level of noise. They meet EN55032/35 Class B, which specifies 10 dB less radiation than Class A, the spec most other boards are designed to meet.

Triple-thick-gold-plated connectors

In industrial computing systems, most connectors are plated with nearly 5 microns of gold. Select connectors on ADLINK motherboards have 15 microns of gold plating, thereby eliminating concerns about corroded pins and bad contacts, and increasing connector connectivity, absolute reliability, and longevity.

Comparison of Industrial ATX Motherboards

The following table compares ADLINK industrial ATX motherboards to those offered by two other suppliers.

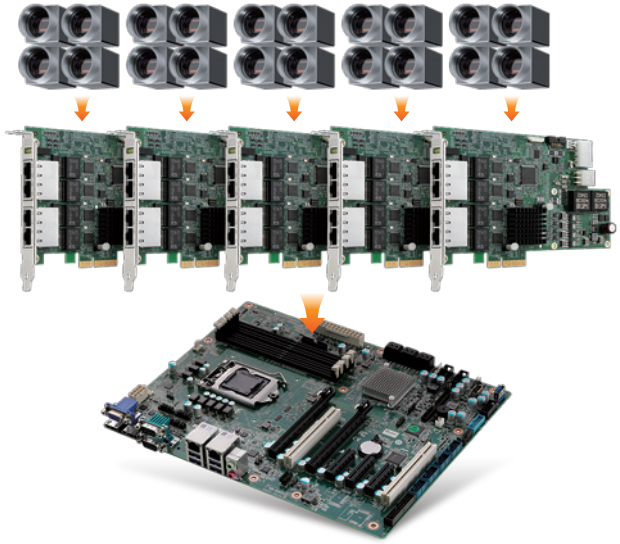
Feature	Description	Vendor 1	Vendor 2	ADLINK
CPU	8th and 9th Generation Intel® Core™ processors	√	√	√
	Intel® Xeon Processors			√
Memory	Dual Channel ECC DDR4 2666 MHz, up to 32 GBx4	√	√	√
PCIe	PCIe Gen3	2*PCIe x8 3*PCIe x4	1*PCIe x16 4*PCIe x4	1*PCIe x16 or 2*PCIe x8 3*PCIe x4
SATA	SATA Gen3	6	5	6
USB	USB 3.2 Gen 2x1	2	2	4
	USB 3.2 Gen 1x1	4	4	2
	USB 2.0	6	6	6
	USB 3.2 Gen 1x1 Type A for internal dongles			1
	USB 2.0 Type A for internal dongles		1	1
COM	RS232/422/485	2	1	2
	RS232	4	5	4
LAN Giga Lan		2	2	2, up to 4 (optional, built-to-order)
DIO		8-bit	8-bit	32-bit
Rugged I/O		N/A	System management software only	USB: 5V stable at 2A (versus USB spec at 0.5A) CE/FCC Class B, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, (performance criterion A) Reliability: 15-micron, gold-plated connectors Alarm mechanism: Board management controller (BMC) supporting SEMA® (optional, built-to-order)

Industrial PC Use Cases

Contact Lenses Inspection System

An ADLINK ATX motherboard connected to multiple cameras performs automated optical inspection (AOI) on a contact lens production line without dropping a frame. The customer previously required a server-grade CPU, but now can use a high-performance Intel® Core™ processor coupled with multiple ADLINK PCIe-GIE72/74 frame grabber cards that have dedicated bandwidth thanks to ADLINK's intelligent PCIe lane allocation. The rugged I/O design and I/O port compatibility improve reliability.

All installed cameras can support non-drop frame capture



Glue Dispensing Machine

A surface-mount technology (SMT) processor uses a robotic glue dispenser built with three ADLINK products: an ATX motherboard, AMP-204C/208C centralized motion controller, and PCI-7230 digital I/O card. The motherboard, with extra gold plating, low EMI, and advanced USB power design, helps make the system exceptionally reliable.



To learn more about ADLINK's industrial ATX motherboards, please visit the ADLINK website at https://www.adlinktech.com/en/Industrial_Motherboards_SBCs_ATX_Motherboards.

[1] VDC Research report, "Embedded Boards, Modules, and Systems: The Basis for Application Value," page 5, 2019.

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