

White Paper

Optimizing next-gen machine vision platform to enhance automated inspection

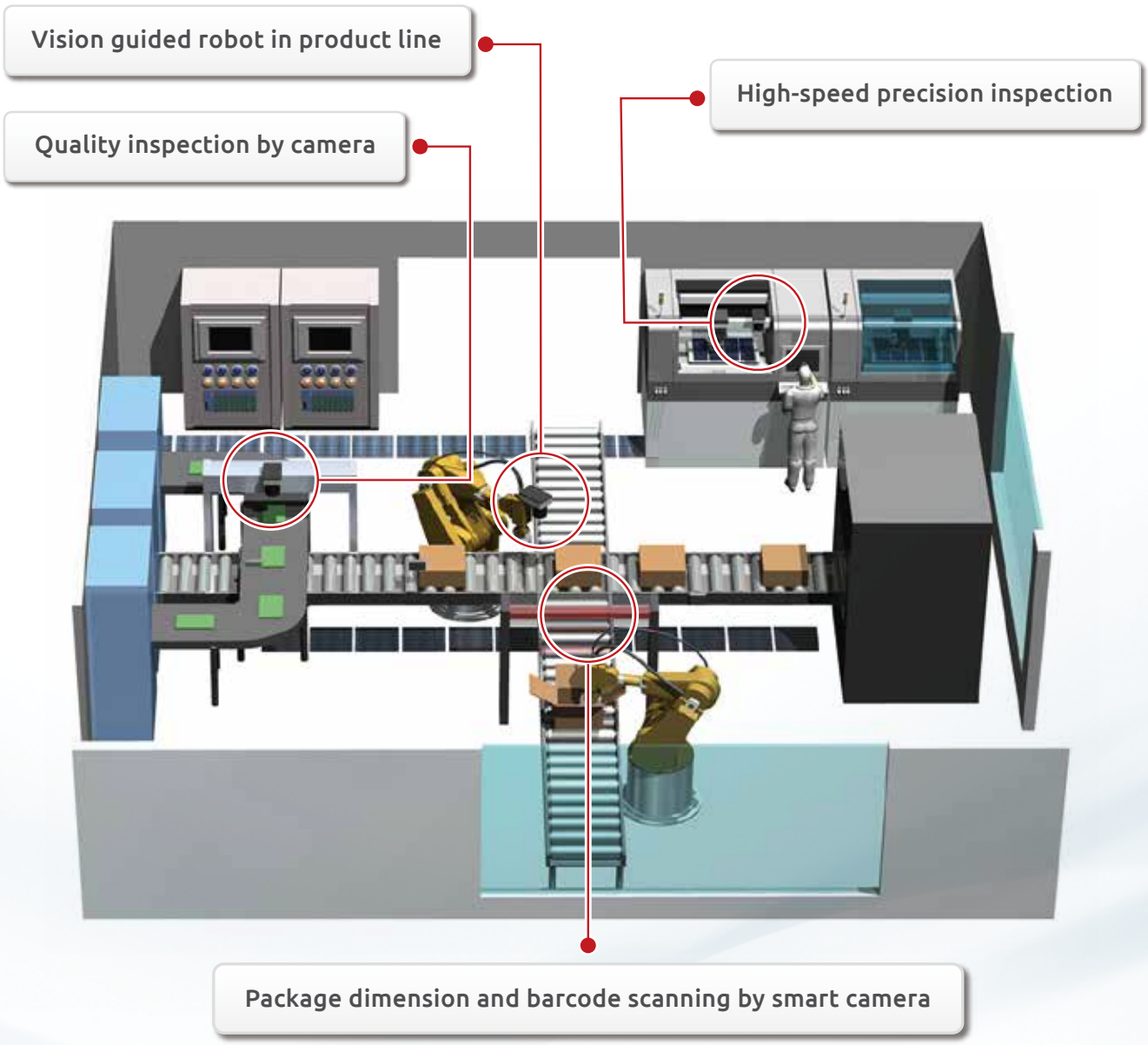
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As the Industry 4.0 initiative encourages manufacturers to actively implement smart automation, machine vision has become indispensable to quality control of automated production. Gradual increases in implementation of related applications have resulted, leveraging continual advances in machine vision accuracy to grow production efficiency.

With increasing requirements for simultaneous acquisition of multiple subject angles through multi-channel cameras for the purposes of inspection, alignment, identification, gauging, pattern match, and others at diverse workstations, density of camera deployment in the production environment expands accordingly, and burdens on machine vision application platforms become heavier. In addition to demands for increased processing speeds of large amounts of image data, motherboard architecture itself can further determine whether the system configuration can exact maximum benefit with minimum investment.

Multi-inspection sites, leverage the resources software for development



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Crafting high performance industrial ATX motherboards with the 6th generation Intel® Core™ processor (codename: Skylake)

Machine vision systems are depended upon to help increase production efficiency by, among other tasks, detecting extremely small and intricate Devices under test (DUTs), acquiring high resolution images at high speeds, and expanding FOV (field of view). The associated hardware must therefore significantly enhance reliability, to guarantee smooth operation of the production line. ADLINK's newest IMB-M43 industrial ATX motherboard, in addition to the latest Intel® 6th generation Intel® Core™ processor with Intel® Q170 chipset and ninth generation graphics display engine (Intel® Gen9 graphics), further circumvents previous design bottlenecks, making it a uniquely ideal computing platform for high-speed machine vision applications.

With the 6th generation Intel® Core™ processor, IMB-M43 delivers not only better CPU computing performance, its iGPU performance is also increased significantly, by 30%. What's more, since the new generation processor supports high-speed energy-saving DDR4 memory, ADLINK has equipped the IMB-M43 motherboard with dual-channel DDR4 2133MHz modules, to buffer large amounts of data and beef up overall performance. The 6th generation Intel® Core™ processor also provides independent PCIe data channels, freeing PCIe slots from sharing bandwidth and sacrificing speed, enabling the IMB-M43 to increase data transmission speeds.

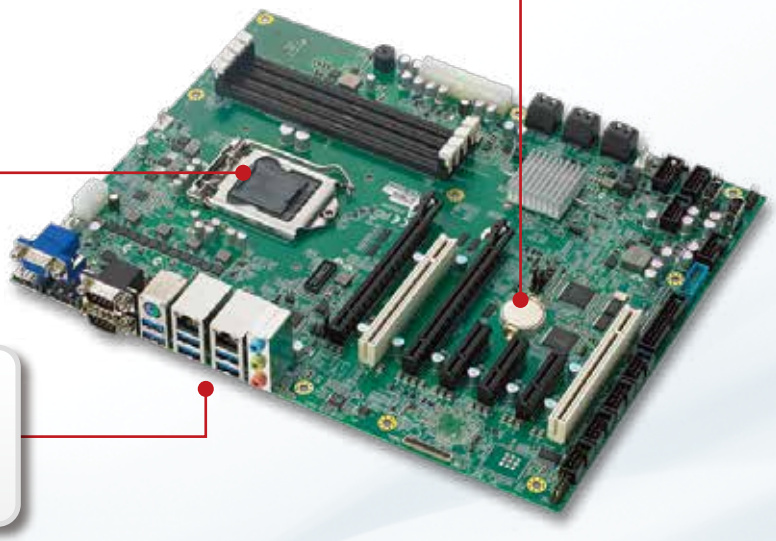
The unique ideal computing platform for high-speed machine vision applications

A new better choice for systems using 5 PCIe slots, lowering TCO up to US$600!

IMB-M43 is the first Intel® desktop Core™ i7 processor-based platform supporting up to 5 PCIe add-on cards in a single IPC system. It eliminates the need for workstation or server boards, dramatically reducing costs.

Skylake is HERE!

Industry's first 6th Gen Intel® Core™ i7/i5/i3 processor (Skylake)-based industrial ATX motherboard with Intel® Q170 chipset



Optimal Platform for Industrial Automation

Flexible PCIe configuration enables integration of off-the-shelf ADLINK PCIe motion and vision cards, and rugged I/O

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Flexible Slot Configuration and Rugged I/O

ADLINK prioritizes expansion slot flexibility for high-end machine vision applications, such that the IMB-M43 provides up to five PCIe slots allowing multiple frame grabbers to be configured on a single motherboard, managing large amounts of data acquired from multiple cameras, or, alternatively, supporting installation of additional graphics cards to enhance image processing capability.

With uniquely flexible PCIe configuration, from the 6th generation Intel® Core™ platform's CPU PCIe bifurcation and lane reversal mapping and flexible I/O features, PCIe slots can be assigned to 4 PCIe 3.0 x4 lanes plus 1 PCIe 3.0 x8 lane, 2 PCIe 3.0 x4 lanes plus 2 PCIe 3.0 x8 lanes, or 2 PCIe 3.0 x4 lanes plus 1 PCIe 3.0 x16 lane, optimizing placement options to fulfill a wide variety of tasking requirements. To facilitate integration, ADLINK's complete portfolio of off-the-shelf motion, vision and I/O cards are fully pre-verified to guarantee maximum compatibility and convenience.

IMB-M43's Flexible PCIe Slot Configuration

From CPU to Border	Slot1 (PEG1)	Slot2 (PCI1)	Slot3 (PEG2)	Slot4 (PEG3)	Slot5 (PCIe1)	Slot6 (PCIe2)	Slot7 (PCI2)
Signal source	CPU	PCI bridge	CPU	CPU	PCH	PCH	PCI bridge
Bandwidth	PCIe 3.0	PCI 2.2	PCIe 3.0	PCIe 3.0	PCIe 3.0	PCIe 3.0	PCI 2.2
Physical slot	x16 slot	PCI slot	x16 slot	x4 slot	x4 slot	x4 slot	PCI slot
Lane config 1 (When slot 4 is occupied)	x8	PCI	x4	x4	x4	x4	PCI
Lane config 2 (When slot 3 is occupied and slot 4 is not)	x8	PCI	x8	N/A	x4	x4	PCI
Lane config 3 (When slot 1 is occupied and slots 3/4 are not)	x16	PCI	N/A	N/A	x4	x4	PCI

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For enhanced durability and reliability, unlike common applications in which gold flash process is used to plate PCI/PCIe/DIMM /LAN/SATA/USB* connectors on the motherboard, the IMB-M43 undergoes gold plating with higher corrosion resistance, plated to at least 15µin thickness, ensuring that the interfaces can withstand a much wider range of environmental conditions and wear. The IMB-M43 also complies with EN55022 Class B standard and EN55024 Class A certifications to deliver more robust electromagnetic interference and tolerance compared to similar market offerings in its class, ensuring security and stability.

The IMB-M43 further reduces TCO by ensuring stable 2A power supply for each USB port at 5V +-5%, with all 14 USB ports supporting up to 14A total, even from a 300W supply, unlike other platforms requiring a 460W PSU to drive the same system due to motherboard consumption exceeding 5V current.

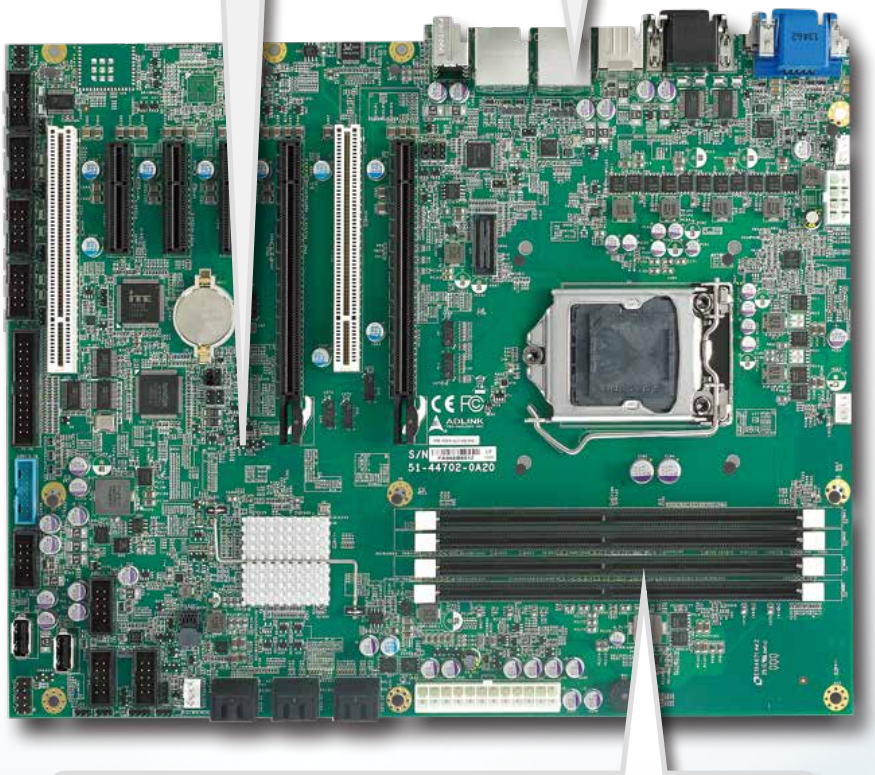
ADLINK's IMB-M43 industrial motherboard delivers enhanced durability and reliability

Rugged EMI Design

EN55022 Class B Radiation Test, 10db Radiation less than competitor Class A

Enhanced USB Compatibility

Unique power design ensures stable USB power



Durable Connectors

15um inch gold/metal plated connectors assure long term reliability

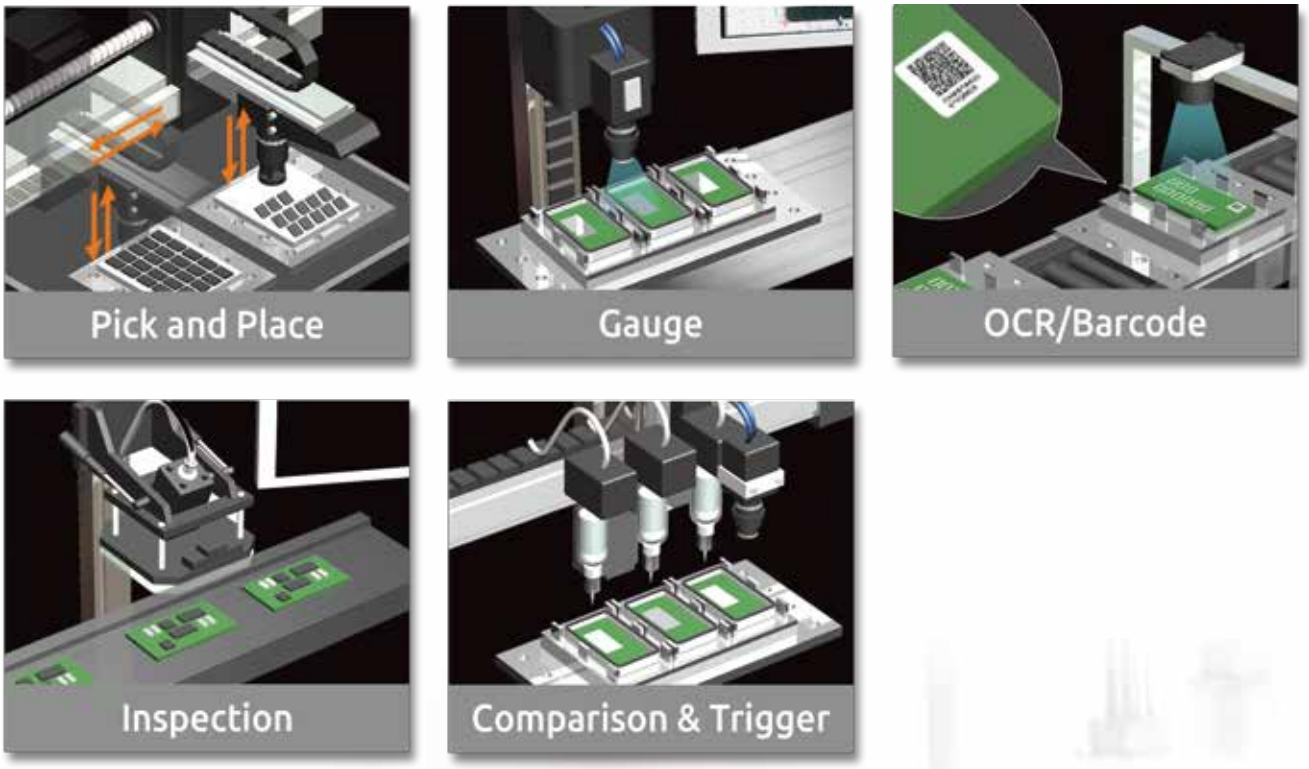
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Streamlined hardware configuration saves overall costs

ADLINK provides not only high-end industrial motherboards, but also frame grabbers with various interfaces, such as the PCIe-GIE74 4CH with PoE+ interface enabling transmission of 1Gb/s, and supporting connection to a GigE Vision camera, and the Euresys CoaXPress frame grabbers to process high bandwidth and long-distance data transmission. These complete solutions can help to configure fully-optimized machine vision systems.

As an example, in a smartphone manufacturing facility and electronic component foundry, machine vision is essential on the production line to execute QA inspection and alignment correction. Conventionally, to process the data from as many as 20 cameras would require a hardware configuration with several computers. Now much more effectively a multi-slot IMB-M43 motherboard with five PCIe-GIE74 frame grabbers can accommodate connection of multiple cameras to a single host computer. Furthermore, since additional software licensing is required for every computer configured, with licensing fees usually several times the cost of the hardware itself, ADLINK solutions further reduce costs of machine vision systems by eliminating the need to deploy multiple host computers.

Machine vision for industrial automation

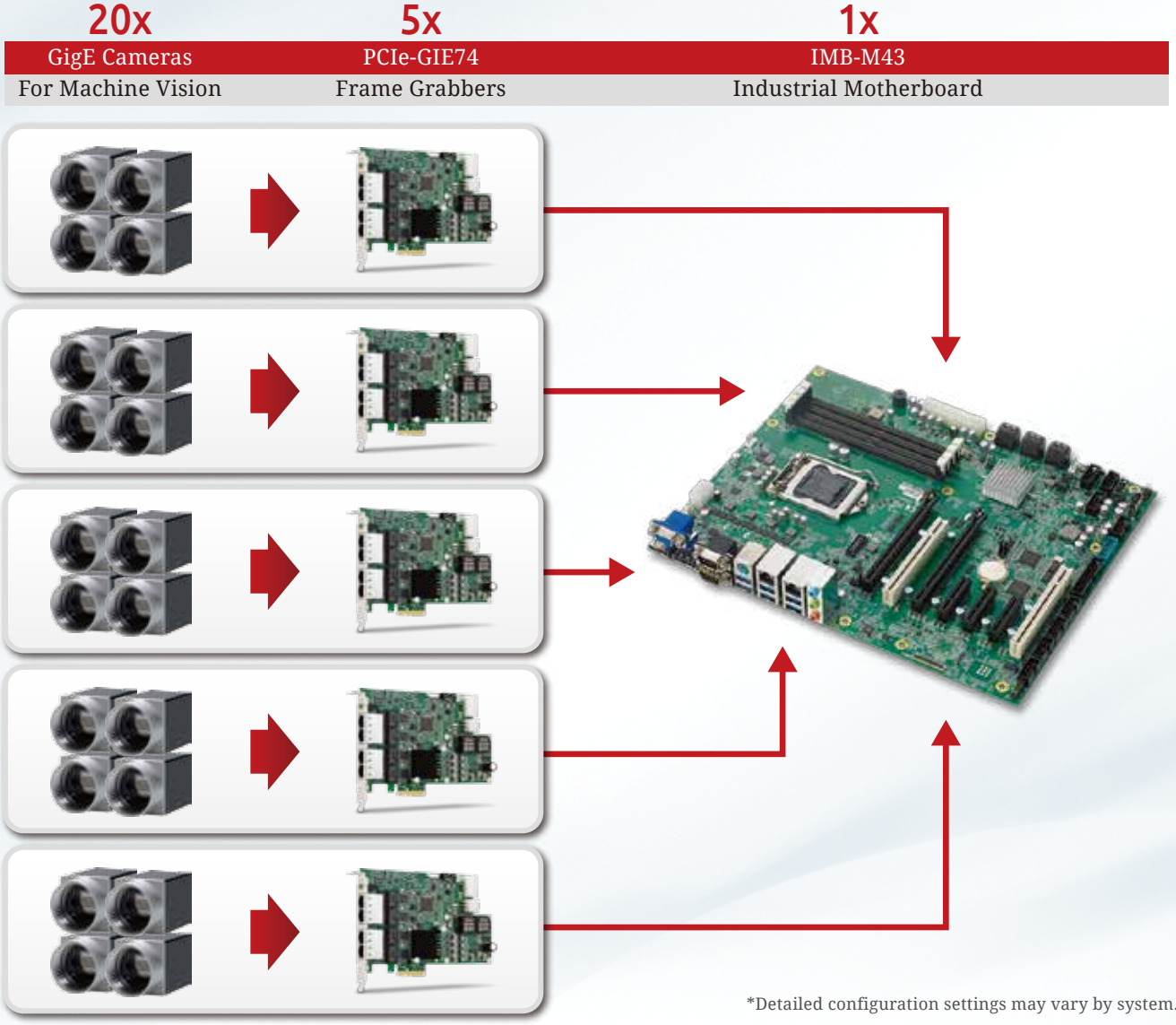


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In another example, in an IC packaging and testing plant, machine vision is used to perform appearance inspection and alignment operations, in which a total of 16 cameras need to be installed at three different stations, every station using four or five cameras to acquire images simultaneously. Multiple graphics cards are required to perform the computations required to process the large amounts of image data. ADLINK's high CP value IMB-M43 utilizes server-grade motherboard specifications to support installation of four PCIe-GIE74 cards with an additional graphics card in five PCIe slots, thereby saving space while achieving the required level of computing performance.

Panel manufacturers have previously used the Euresys Camera Link solution to build machine vision inspection systems on the production line. As modules supporting the new generation CoaXPress ultra-high speed standard have become available, users have been able to upgrade their original systems. High performance IMB-M43 industrial motherboard with Euresys CoaXPress frame grabbers have tripled data transmission speeds, further accelerating production speeds for vastly improved yield and throughput.

A multi-slot IMB-M43 industrial motherboard with five PCIe-GIE74 frame grabbers installed can accommodate connection of up to twenty GigE cameras to a single host computer.



*Detailed configuration settings may vary by system.

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Complete product line satisfies every application need

For machine vision applications focusing on factory automation, user priorities include maximizing image capture, transmission, and processing. The 6th generation Intel® Core™ processors provide not only maximum computing performance, but also increased RAM and bandwidth. Thus equipped, the IMB-M43's flexible slot configuration delivers sufficient expansion slots to eliminate the need to furnish server-grade motherboards while simplifying onsite configuration of the machine vision system. Installation space is conserved, system building costs are reduced, and robust construction allows it to withstand the most rigorous manufacturing environments, ensuring stability, reliability, and maximum performance on the production line.

With machine vision development expected to become even more dynamic in the future, ADLINK is ideally positioned to continue to provide complete industry support, irrespective of machine vision operations' growth and evolution, whether for native PC USB and GigE applications or ultra-speed applications such as Camera Link and CoaXPress, from industrial platform and image capture, to motion control and I/O module and even image processing and software-based analysis. ADLINK's one-stop-service capability and extensive field integration and support experience continue to enable reliable, high-speed machine vision inspection applications.

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ADLINK is a Premier member of the Intel® Internet of Things Solutions Alliance. From modular components to market-ready systems, Intel and the 400+ global member companies of the Intel® Internet of Things Solutions Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Close collaboration with Intel and each other enables Alliance members to innovate with the latest technologies, helping developers deliver first-in-market solutions. Learn more at: intel.com/iotsolutionsalliance

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