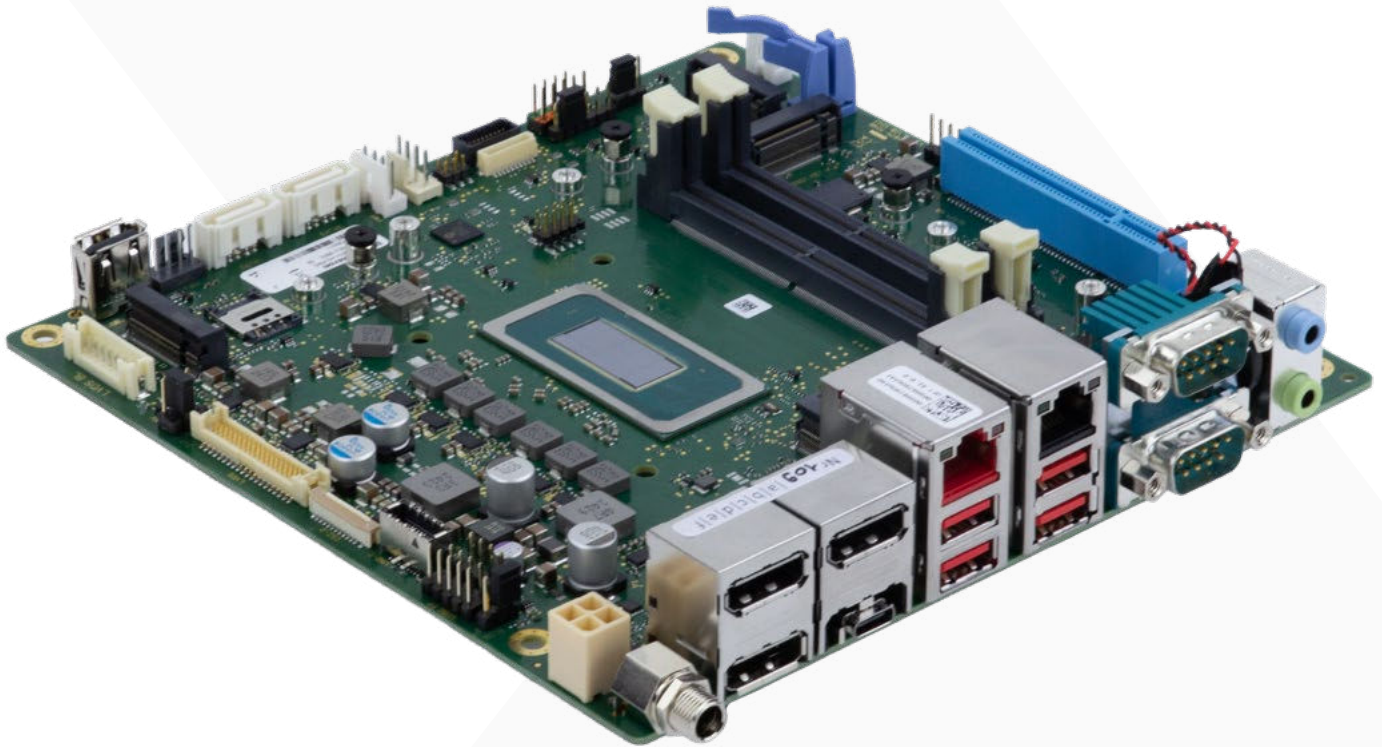


K4031-H mITX

Industrial Series



Intel® Core™ Ultra 7 & 5 Processors Meteor Lake H

- ▶ Latest DDR5 memory technology for best-in-class system performance
- ▶ Intel® Arc™ GPU with up to eight Xe cores (up to 128 graphics execution units)
- ▶ Up to four concurrent 4K60 HDR displays or two 8K displays
- ▶ Dual Channel LVDS (24 Bit) and eDP V1.4b (4K) onboard
- ▶ New integrated NPU for dedicated AI acceleration with up to 20x performance/watt improvement

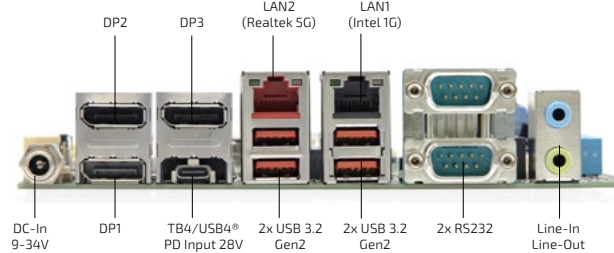
K4031-H mITX Industrial Series

The K4031-H mITX Industrial Motherboard is a compact, high-performance platform engineered for demanding embedded and industrial applications. Powered by the latest Intel® Core™ Ultra processors, it delivers outstanding computing performance and advanced graphics capabilities through Intel® Arc™ architecture with up to 128 execution units. With support for up to four independent 4K displays or dual 8K outputs, the K4031-H offers outstanding visual capabilities through a versatile mix of DisplayPort™, USB Type-C with TB4*/USB4®, embedded DisplayPort™ and dual-channel 24-bit LVDS interfaces.

Designed for flexibility and scalability, the board features four M.2 slots for storage and wireless connectivity, along with a rich set of I/O options including GPIO, dual COM ports, USB 3.2 Gen2 and TB4*/USB4™. Built for 24/7 continuous operation and validated for enhanced temperature ranges up to 60 °C, the K4031-H is ideally suited for a wide range of vertical markets—from industrial automation to digital signage and medical systems.

- Intel® Core™ Ultra Processors
- DDR5-5600 SODIMM, max 96 GByte
- Intel® Arc™ GPU with up to eight Xe-cores (up to 128 graphics execution units)
- 3x DisplayPort™ V1.4a
- Up to 2x USB Type-C with TB4* / USB4® or DP alt mode / USB 3.2 Gen2
- Dual Channel LVDS, eDP V1.4b and MIPI-CSI2 camera interface
- 8 Bit GPIO & HD Audio onboard
- 4x USB3.2 Gen2 and 2x USB3.2 Gen1
- 1x Intel® 1GbE LAN, 1x Realtek 5GbE incl. Teaming
- 2x SATA 6G
- 1x PCI Express® x8 (Gen 5, open slot)
- 2x M.2 Key M x4 Gen4
- 1x M.2 Key B with 5G card support

- 1x M.2 Key E (WLAN)
- Intel® integrated iTPM V2.0
- 2x RS-232 support onboard
- HW Watchdog onboard
- WideRange internal/external DC input 9-34V, PowerDelivery Sink Mode (up to 28V / 140W via Type-C)



*) Thunderbolt™ 4 certification ongoing

Technical Information

SYSTEM	PROCESSOR AI CO-PROCESSOR MEMORY	Intel® Core™ Ultra 7 155H Intel® Core™ Ultra 5 125H Intel® NPUs* integrated (up to 11 TOPS), Intel® GNA 3.5 DDR5 5600 SDRAM 2x SO DIMM socket, up to 96 GByte memory, non-ECC
VIDEO	GRAPHICS CAMERA	Intel® Arc™ GPU with up to eight Xe-cores (up to 128 graphics execution units) 1x TB4****/USB4® (DP2.1 up to UHBR20 8K) 3x DP V1.4a up to 8K 1x USB-C with DPoC via header (USB Key-A)** 1x eDP V1.4b up to 5K, 1x Dual-Channel 24bit LVDS*** Supports 4 simultaneous 4K encode streams MIPI-CSI2 camera interface (22pin RPI22 compatible)
AUDIO	AUDIO CODEC AUDIO INTERFACE	Realtek ALC256 Stereo, High Definition Audio Codec
NETWORK CONNECTION	ETHERNET 1 ETHERNET 2	Intel® i219LM with 10/100/1000 MBit/s, Wake-on-LAN (WoL) by interesting Packets, Link Status Change and Magic Packet™, PXE Support, BIOS MAC Address Display, Teaming Support Realtek RTL8126 with 10/100/1000/2500/5000 MBit/s, Wake-on-LAN (WoL) by interesting Packets, Link Status Change and Magic Packet™, PXE Support, BIOS MAC Address Display, Teaming Support
PERIPHERAL CONNECTION	USB SERIAL PORT OTHER I/Os	3x USB 2.0 (by headers), 1x USB 2.0 Type-A stick socket 1x USB-C with TB4****/USB4® support 4x USB3.2 Gen2 Type A, 2x USB3.2 Gen1 (by header), 1x USB3.2 Gen2 (by header) 2x RS232 8 Bit GPIO (by header); WLAN LED and on/off support, Monitoring Alert LED 3.3 V/5 V/12 V supply voltage output

*) Neural Processing Unit: Dedicated Low Power AI Engine, integrated in Intel CPU
**) DPoC: DisplayPort over USB-Type-C (Alternate Mode)
***) Simultaneous use of LVDS and eDP is not supported.
****) Thunderbolt™ 4 certification ongoing

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STORAGE & EXPANSION	SATA PCIe SLOT M.2 SLOTS	2x Serial ATA III 600 Interface (up to 6GBit/s), NCQ, AHCI, RAID0+1 1x PCIe x8 (8 lanes, Gen5, open slot for x16 card support) 2x M.2 2230/2242/2280 (Key-M, PCIe x4/Gen4/NVMe SSD modules) 1x M.2 2230/2242/3052 (Key-B PCIe x2/USB2 /5G module) Nano SIM socket for 5G module 1x M.2 2230 (Key-E, WLAN/Bluetooth modules, PCIe/USB/CNVio)
POWER	CONNECTOR INPUT VOLTAGE OUTPUT VOLTAGE	External/Internal DC-In (DC Jack/4-Pin Mini-Fit) DC Input 9–34V, max. 10A (internal or external connector) PowerDelivery (PD3.1 EPR) via Rear USB-C (max. 28V, 5A) USB-C Power Delivery 15W (5V, max. 3A)
FIRMWARE	BIOS WATCHDOG REAL TIME CLOCK TPM	AMI Aptio 5.x (UEFI) BIOS modified and adapted by Kontron; Recovery BIOS, SM-BIOS (DMI), BIOS and CPU Microcode Update, Quick Boot, Logo Boot, Quiet Boot, Plug & Play, Automatic DRAM and PCIe Configuration, BIOS Support for S.M.A.R.T., Advanced Power Management, ACPI S3/S4 (planned), Wake on time from S5. Programmable 3-stage Watchdog to generate system reset event Integrated TPM V2.0 (Intel® integrated)
SYSTEM CONTROL	FP HEADER SECURITY	1x Header for Reset button, HDD LED, Power button, Power LED Recovery BIOS, System and BIOS Password, Boot Sequence Control, Serial-/USB-Port Access Protection, Write Protection for Flash BIOS, Downflash protection, UEFI Secure Boot, EraseDisk (BIOS Feature), Intel integrated TPM V2.0
COOLING	FAN	2x PWM fan (CPU/System)
SOFTWARE	OS SUPPORT	MS Windows® 10 IoT (LTSC), MS Windows® 11, MS Windows® 11 IoT (LTSC), Linux 64 No legacy OS support, no MBR installation (UEFI only)
MECHANICAL	DIMENSION (L x W)	Mini-ITX: 6.7" x 6.7" (170 x 170 mm)
ENVIRONMENTAL	OPERATION TEMPERATURE	0 °C - 60 °C
CERTIFICATION	EMC + SAFETY	Planned: cTÜVus acc. IEC62368-1, CE Class B incl. Industrial Immunity, UKCA, FCC-B verified

Motherboard Versions

	PROCESSOR (SoC)	GRAPHICS Intel® Arc® Graphics	MEMORY
K4031-H2	Intel® Core™ Ultra 5 125H 14-Core @28W TDP (Flex cTDP option **) TDP 28W: 1.2 / 4.5 GHz	GPU @ 2.2 GHz 112x Execution Units (EUs) Up to 4 displays concurrent 4K120/5K60 HDR (1 pipe/1 port), 8K60 (2 pipe/1 port), 4x4K60 HDR (concurrent)	DDR5-5600 Two sockets Max. 96 Gbyte
K4031-H5	Intel® Core™ Ultra 7 155H 16-Core @28W TDP (Flex cTDP option **) TDP 28W: 1.4 / 4.8 GHz	GPU @ 2.25 GHz 128x Execution Units (EUs) Up to 4 display concurrent 4K120/5K60 HDR (1 pipe/1 port), 8K60 (2 pipe/1 port), 4x4K60 HDR (concurrent)	DDR5-5600 Two sockets Max. 96 Gbyte

*) Base Frequency / 1 core Turbo / Multi core Turbo
**) cTDP – Easy & flexible reduction of CPU TDP down to 20 W

Power Supply Requirements

SOURCE	VOLTAGE RANGE	MIN. PS LOAD	MAX. VOLTAGE TOLERANCE	TYP. MOTHERBOARD INPUT POWER¹	MAX. MOTHERBOARD INPUT POWER²
DC-IN (WideRange)	9 V - 34 V (recommended nominal range)	0 A	8.5 V - 36 V (absolute maximum ratings)	<12W (Idle) 60W (Full load)	140 W (external or internal DC-In)
PowerDelivery (PD3.1 EPR) via Rear USB-C	up to 28V PD Sink	0 A	28V: +-5%	<12W (Idle) 60W (Full load)	140 W

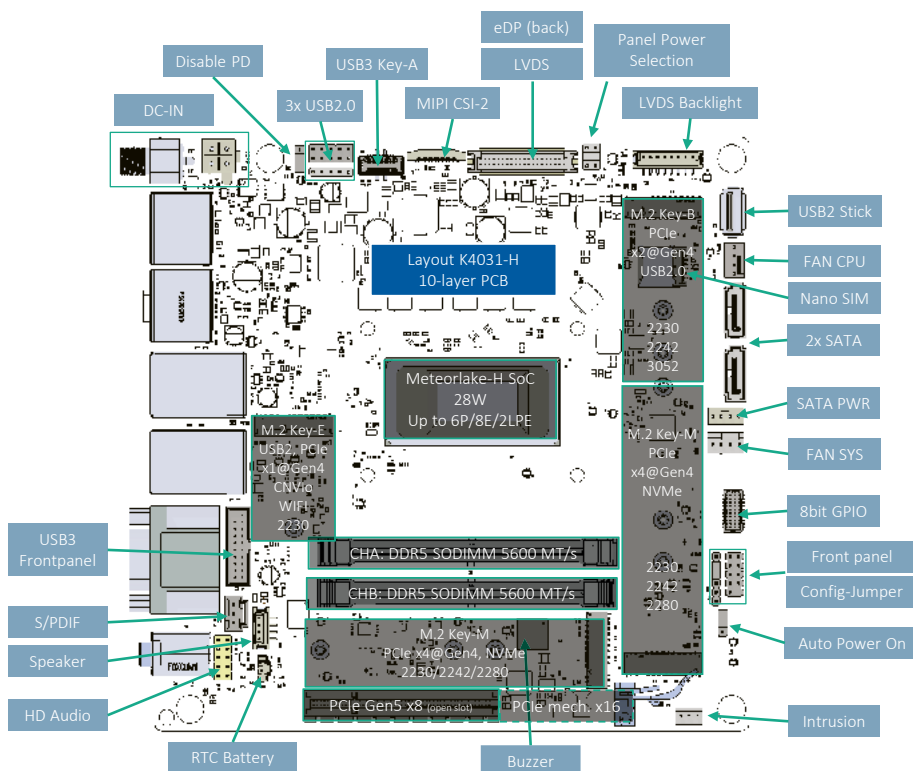
1) Motherboard incl. Memory and M.2 NVMe SSD (approximations for MS Windows 11 Idle Mode / Full Processor Load @ 28 W TDP)
2) Motherboard incl. Memory, M.2, PCIe/M.2 PCIe devices, USB
See TechNotes document for detailed power requirements

FEATURES	Chipset / SoC (APU) DP / HDMI / LVDS / eDP Stereo Audio / 5.1 Multichannel Audio / Front Panel Audio Buzzer /int. Speaker support (stereo) ² GbE LAN / Dual GbE LAN / 2.5 GbE LAN / 5 GbE Lan WoL / PXE / LAN Teaming / TSN SATA / SATA RAID / M.2 (SATA) / M.2 (PCIe/NVMe) / NVMe RAID USB 2.0 / USB 3.2 (Gen1) / USB 3.2 (Gen2) / USB 3.2 (Gen2x2) Type-C FAN monitored & controlled CPU / AUX1 / AUX2 TEMP monitored CPU / onboard sensors / external sensor	Intel® Core™ Ultra SoC + / - / + / + + / 0 ¹ / + + / + + / - / - / + + / + / + / - + / + / - / + / + + / + / + / + + / + / - + / + / -
SPECIAL FEATURES	COM interface support for RS-232 / RS-485 / RS-422 Fan configuration / System Monitoring Recovery BIOS / Flash Update / Multi Boot HDD Password / EraseDisk / TPM V2.0 onboard / optional TPM module Multi Stage Watchdog Operating Mode 24-7 / 8-5 (hrs per day - days per week) Motherboard operating temperature range (chassis inside) ³	+ / - / - + / + + / + / + + / + / + / - + + / - 0 °C ... +60 °C
INTERNAL CONNECTORS	50 DIMM Sockets (DDR5 5600) SATA-III / M.2 Key-M SSD / M.2 Key-B M.2 2230 (Key-E for WLAN/Bluetooth) Front Panel Audio (9-Pin, HD Audio) / S/PDIF Out (Digital Audio) USB 2.0 pin header (2 port) / USB 2.0 single port header / USB Stick socket USB 3.2 Gen1 pin header (2 ports) / USB 3.2 Gen2 Type A header Serial COM header / CCTalk header / Parallel Port header LVDS / LVDS Backlight / Embedded DisplayPort @ 4 lanes FAN PSU / CPU (PWM) / AUX1 (PWM) Intrusion (Case Open) / GPIO (8 Bit) / SMBus Stereo Speaker header / Digital Mic header Front Panel (Power Switch, Reset Switch, LEDs, Intel 10 pin header) ⁴ SATA Drive Power Connector (5 V/12 V) / DC-In Connector (4 pin)	2 2 / 2 / 1 1 1 / 1 1 / 1 / 1 1 / 1 0 / 0 / - 1 / 1 / 1 - / 1 / 1 1 / 1 / 1 1 / - 1 1 / 1
EXTERNAL CONNECTORS	HDMI / DVI / VGA DisplayPort / USB Type-C Alternate Mode (DPoC) / Thunderbolt™ +USB4® Audio Mic. In / Line in / Line out (or driver configuration) LAN (RJ-45) / PS/2 Keyboard / Mouse USB 2.0 / USB 3.2 Gen1 / USB 3.2 Gen2 DC-In connector (external input) 5.5/2.5mm / lockable. Serial COM interface	- / - / - 3 / 1 / 1 0 / 1 / 1 2 / - / - 0 / 0 / 5 1 / + 2

1) Multichannel audio only via S/PDIF or DisplayPort™
 2) Stereo speaker support; 2 W @4Ω
 3) Forced cooling required for high operating temperature range. See TechNotes document for details
 4) Header pin pitch is 2.54 mm

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Connector/Socket Diagram



ARTICLE	PART NO.	DESCRIPTION
K4031-H2	F5120-V232	Intel® Core™ Ultra 5 125H
K4031-H5	F5120-V235	Intel® Core™ Ultra 7 155H

Accessories

ACTIVE HEATSINK + BACKPLATE	F5000-C028	28W TDP
DRIVE POWER CABLE	S26361-F5000-K001	400 mm, power connector for 1x SATA and 1x slimline DVD
AC-ADAPTER 19V/65W	S26361-F5000-P006	For applications up to 20 W TDP (SoC)
AC-ADAPTER 20V/120W	S26361-F5000-P007	lockable connector
SMARTCASE™ S740	F5000-J018	Planned: Chassis kit solution based on SMARTCASE™ S7xx design
SMARTCASE™ S903	F5000-J017	Mini-ITX chassis solution with support for standard ATX IO-Shield
M.2 4XCOM ADD ON	F5000-M006	K1202-A1; AddOn for M.2 Key-B/M slot to provide four serial ports
DUAL SERIAL PORT CABLE	F5000-K022	Dual Serial Port Cable for K1202-A Add On, Length=400mm. Standard PCI slot bracket included.

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