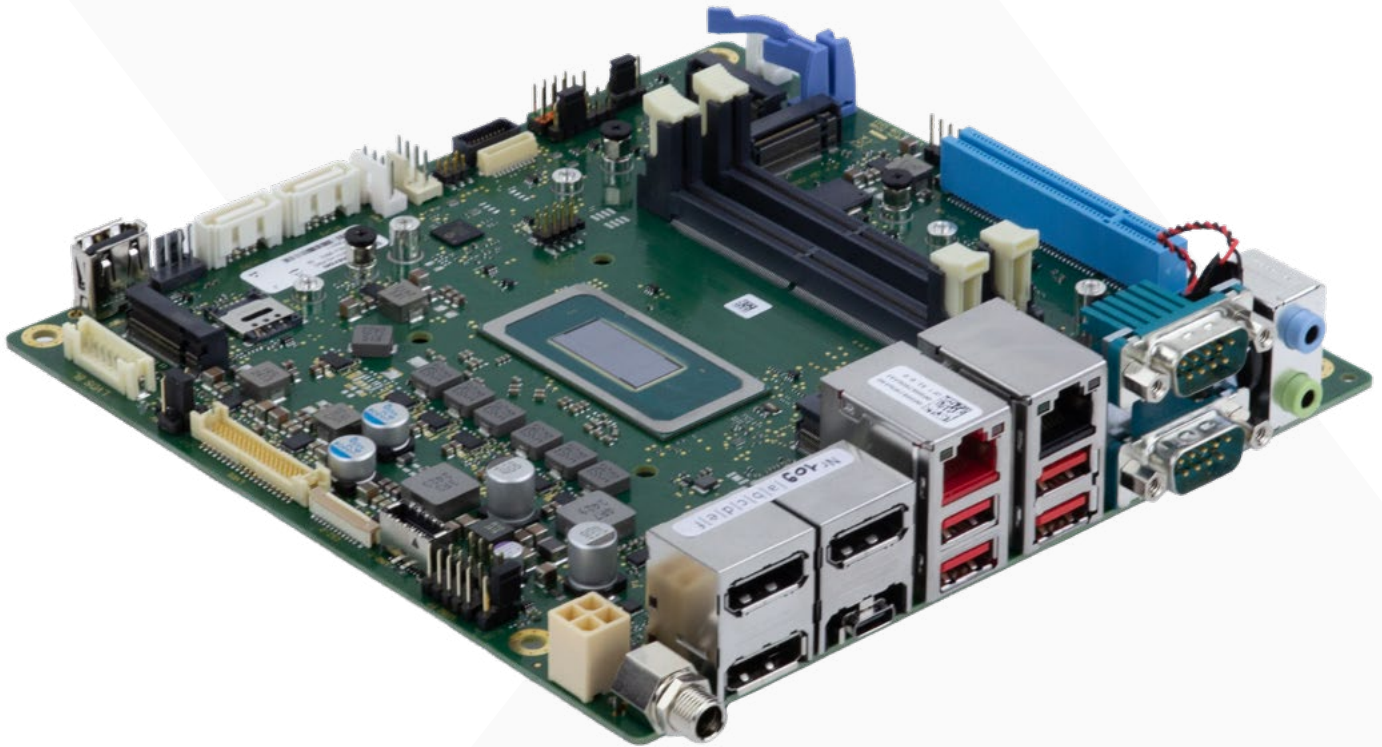


# K4031-H mITX

## 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

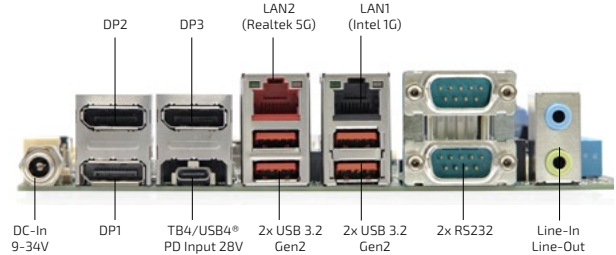
## K4031-H mITX Industrial Series

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

<b>SYSTEM</b>	<b>PROCESSOR</b> <b>AI CO-PROCESSOR</b> <b>MEMORY</b>	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
<b>VIDEO</b>	<b>GRAPHICS</b>  <b>CAMERA</b>	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)
<b>AUDIO</b>	<b>AUDIO CODEC</b> <b>AUDIO INTERFACE</b>	Realtek ALC256 Stereo, High Definition Audio Codec
<b>NETWORK CONNECTION</b>	<b>ETHERNET 1</b>  <b>ETHERNET 2</b>	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
<b>PERIPHERAL CONNECTION</b>	<b>USB</b>  <b>SERIAL PORT</b> <b>OTHER I/Os</b>	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

Thunderbolt and the Thunderbolt logo are trademarks of Intel Corporation in the U.S. and/or other countries.

<b>STORAGE &amp; EXPANSION</b>	<b>SATA PCIe SLOT M.2 SLOTS</b>	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)
<b>POWER</b>	<b>CONNECTOR INPUT VOLTAGE  OUTPUT VOLTAGE</b>	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)
<b>FIRMWARE</b>	<b>BIOS  WATCHDOG REAL TIME CLOCK TPM</b>	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)
<b>SYSTEM CONTROL</b>	<b>FP HEADER SECURITY</b>	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
<b>COOLING</b>	<b>FAN</b>	2x PWM fan (CPU/System)
<b>SOFTWARE</b>	<b>OS SUPPORT</b>	MS Windows® 10 IoT (LTSC), MS Windows® 11, MS Windows® 11 IoT (LTSC), Linux 64 No legacy OS support, no MBR installation (UEFI only)
<b>MECHANICAL</b>	<b>DIMENSION (L x W)</b>	Mini-ITX: 6.7" x 6.7" (170 x 170 mm)
<b>ENVIRONMENTAL</b>	<b>OPERATION TEMPERATURE</b>	0 °C - 60 °C
<b>CERTIFICATION</b>	<b>EMC + SAFETY</b>	Planned: cTÜVus acc. IEC62368-1, CE Class B incl. Industrial Immunity, UKCA, FCC-B verified

## Motherboard Versions

	<b>PROCESSOR (SoC)</b>	<b>GRAPHICS Intel® Arc® Graphics</b>	<b>MEMORY</b>
<b>K4031-H2</b>	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
<b>K4031-H5</b>	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

<b>SOURCE</b>	<b>VOLTAGE RANGE</b>	<b>MIN. PS LOAD</b>	<b>MAX. VOLTAGE TOLERANCE</b>	<b>TYP. MOTHERBOARD INPUT POWER<sup>1</sup></b>	<b>MAX. MOTHERBOARD INPUT POWER<sup>2</sup></b>
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

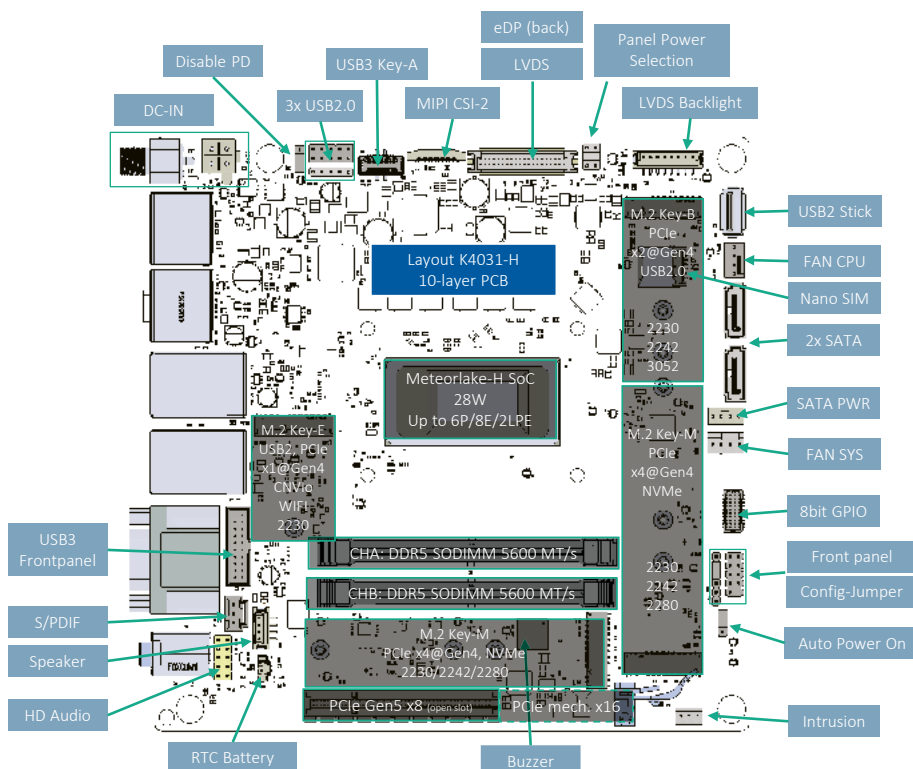
1) Motherboard incl. Memory and M.2 NVMe SSD (approximations for MS Windows 11 Idle Mode / Full Processor Load @ 28 W TDP  
2) Motherboard incl. Memory, M.2, PCIe/M.2 PCIe devices, USB  
See TechNotes document for detailed power requirements

<b>FEATURES</b>	Chipset / SoC (APU) DP / HDMI / LVDS / eDP Stereo Audio / 5.1 Multichannel Audio / Front Panel Audio Buzzer /int. Speaker support (stereo) <sup>2</sup> 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 <sup>1</sup> / + + / + + / - / - / + + / + / + / - + / + / - / + / + + / + / + / + + / + / - + / + / -
<b>SPECIAL FEATURES</b>	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) <sup>3</sup>	+ / - / - + / + + / + / + + / + / + / - + + / - 0 °C ... +60 °C
<b>INTERNAL CONNECTORS</b>	SO 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) <sup>4</sup> 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
<b>EXTERNAL CONNECTORS</b>	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

Thunderbolt and the Thunderbolt logo are trademarks of Intel Corporation in the U.S. and/or other countries.

## 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.

## Global Headquarters

### Kontron Europe GmbH

Gutenbergstraße 2  
 85737 Ismaning, Germany  
 Tel.: +49 821 4086-0  
 info@kontron.com

www.kontron.com