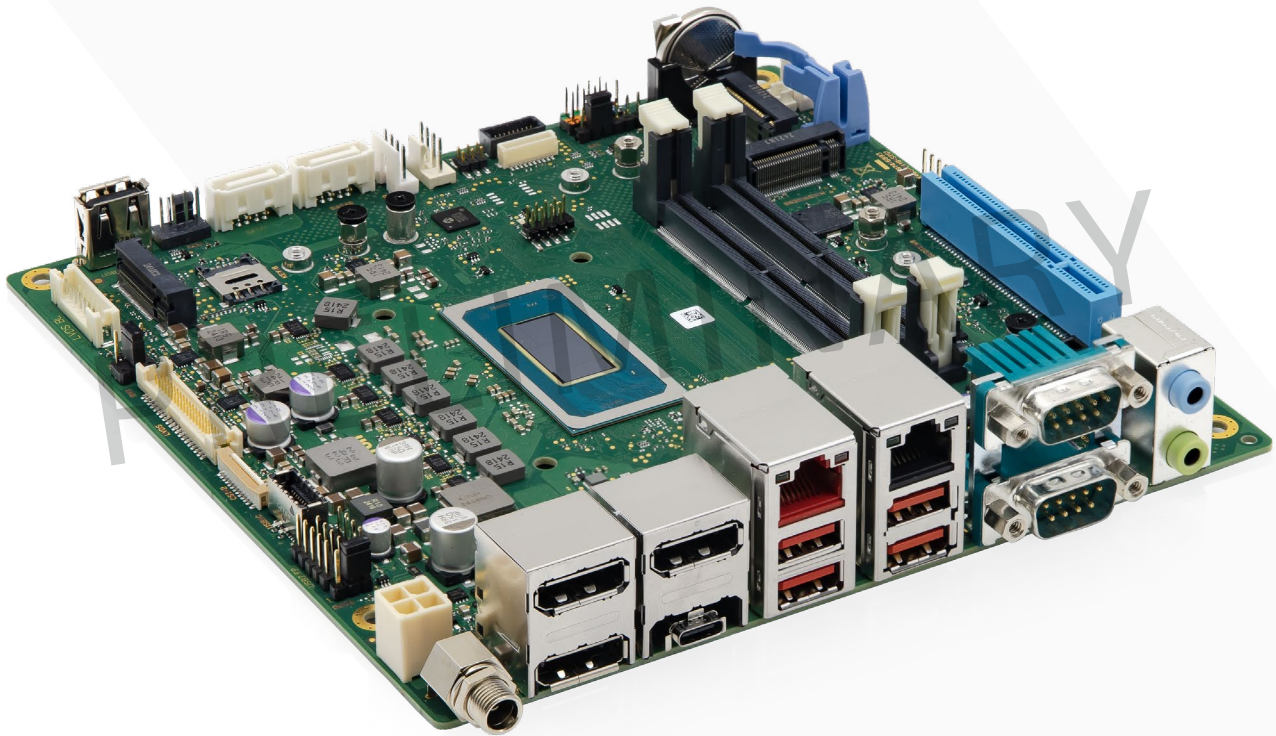


# K4031-H mITX

## 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

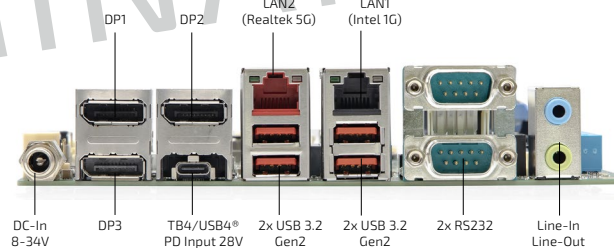
## K4031-H mITX Industrial Series

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.

- 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

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.

- 1x M.2 Key E (WLAN)
- Intel® integrated iTPM V2.0
- 2x RS-232 support onboard
- HW Watchdog onboard
- WideRange internal/external DC input 8-34V, PowerDelivery Sink Mode (up to 28V / 120W via Type-C)



\*) Thunderbolt™ 4 certification ongoing

## Technical Information

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

\*) 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<br>PCIe SLOT<br>M.2 SLOTS                              | 2x Serial ATA III 600 Interface (up to 6Gbit/s), NCQ, AHCI, RAID0+1<br>1x PCIe x8 (8 lanes, Gen5, open slot for x16 card support)<br>2x M.2 2230/2242/2280 (Key-M, PCIe x4/Gen4/NVMe SSD modules)<br>1x M.2 2230/2242/3052 (Key-B PCIe x2/USB2 /5G module)<br>Nano SIM socket for 5G module<br>1x M.2 2230 (Key-E, WLAN/Bluetooth modules, PCIe/USB/CNVio)                                     |
| POWER               | CONNECTOR<br>INPUT VOLTAGE<br><br>OUTPUT VOLTAGE            | External/Internal DC-In (DC Jack/4-Pin Mini-Fit)<br>DC Input 8-34V, max. 10A (internal or external connector)<br>PowerDelivery (PD3.1 EPR) via Rear USB-C (max. 28V, 5A)<br>USB-C Power Delivery (Sink, up to 28, max. 120 W)<br>USB-C Power Delivery 15W (5V, max. 3A)                                                                                                                        |
| FIRMWARE            | BIOS                                                        | AMI Aptio 5.x (UEFI) BIOS modified and adapted by Kontron;<br>Recovery BIOS, SM-BIOS (DMI), BIOS and CPU Microcode Update, Quick Boot,<br>Logo Boot, Quiet Boot, Plug & Play, Automatic DRAM and PCIe Configuration,<br>BIOS Support for S.M.A.R.T., Advanced Power Management,<br>ACPI S3/S4 (planned), Wake on time from S5.<br>Programmable 3-stage Watchdog to generate system reset event |
| SYSTEM CONTROL      | WATCHDOG<br>REAL TIME CLOCK<br>TPM<br>FP HEADER<br>SECURITY | Integrated<br>TPM V2.0 (Intel® integrated)<br>1x Header for Reset button, HDD LED, Power button, Power LED<br>Recovery BIOS, System and BIOS Password, Boot Sequence Control,<br>Serial-/USB-Port Access Protection, Write Protection for Flash BIOS,<br>Downflash protection, UEFI Secure Boot,<br>EraseDisk (BIOS Feature), Intel integrated TPM V2.0                                        |
| COOLING             | FAN                                                         | 2x PWM fan (CPU/System)                                                                                                                                                                                                                                                                                                                                                                        |
| SOFTWARE            | OS SUPPORT                                                  | MS Windows® 10 IoT (LTSC),<br>MS Windows® 11, MS Windows® 11 IoT (LTSC),<br>Linux 64<br>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: cTUVus acc. IEC62368-1, CE Class B incl. Industrial Immunity, UKCA,<br>FCC-B verified                                                                                                                                                                                                                                                                                                 |

## Motherboard Versions

|          | PROCESSOR (SoC)                                                                               | GRAPHICS<br>Intel® Arc® Graphics                                                                                                                                  | MEMORY                                    |
|----------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| K4031-H2 | Intel® Core™ Ultra 5 125H<br>14-Core @28W TDP (Flex cTDP option **)<br>TDP 28W: 1.2 / 4.5 GHz | GPU @ 2.2 GHz<br>112x Execution Units (EUs)<br>Up to 4 displays concurrent<br>4K120/5K60 HDR (1 pipe/1 port),<br>8K60 (2 pipe/1 port),<br>4x4K60 HDR (concurrent) | DDR5-5600<br>Two sockets<br>Max. 96 Gbyte |
| K4031-H5 | Intel® Core™ Ultra 7 155H<br>16-Core @28W TDP (Flex cTDP option **)<br>TDP 28W: 1.4 / 4.8 GHz | GPU @ 2.25 GHz<br>128x Execution Units (EUs)<br>Up to 4 display concurrent<br>4K120/5K60 HDR (1 pipe/1 port),<br>8K60 (2 pipe/1 port),<br>4x4K60 HDR (concurrent) | DDR5-5600<br>Two sockets<br>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 POWER <sup>1</sup> | MAX. MOTHERBOARD INPUT POWER <sup>2</sup> |
|------------------------------------------|----------------------------------------|--------------|-----------------------------------------|-------------------------------------------|-------------------------------------------|
| DC-IN<br>(WideRange)                     | 8 V - 34 V (recommended nominal range) | 0 A          | 7.6 V - 36 V (absolute maximum ratings) | tbd                                       | tbd W (external or internal DC-In)        |
| PowerDelivery (PD3.1 EPR) via Rear USB-C | up to 28V PD Sink                      | 0 A          | 28V: +-5%                               | tbd                                       | 140 W                                     |

<sup>1</sup>) Motherboard incl. Memory and M.2 NVMe SSD (approximations for MS Windows 11 Idle Mode / Full Processor Load @ 28 W TDP)

<sup>2</sup>) Motherboard incl. Memory, M.2, PCIe/M.2 PCIe devices, USB

See TechNotes document for detailed power requirements

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

1) Multichannel audio only via S/PDIF or DisplayPort™

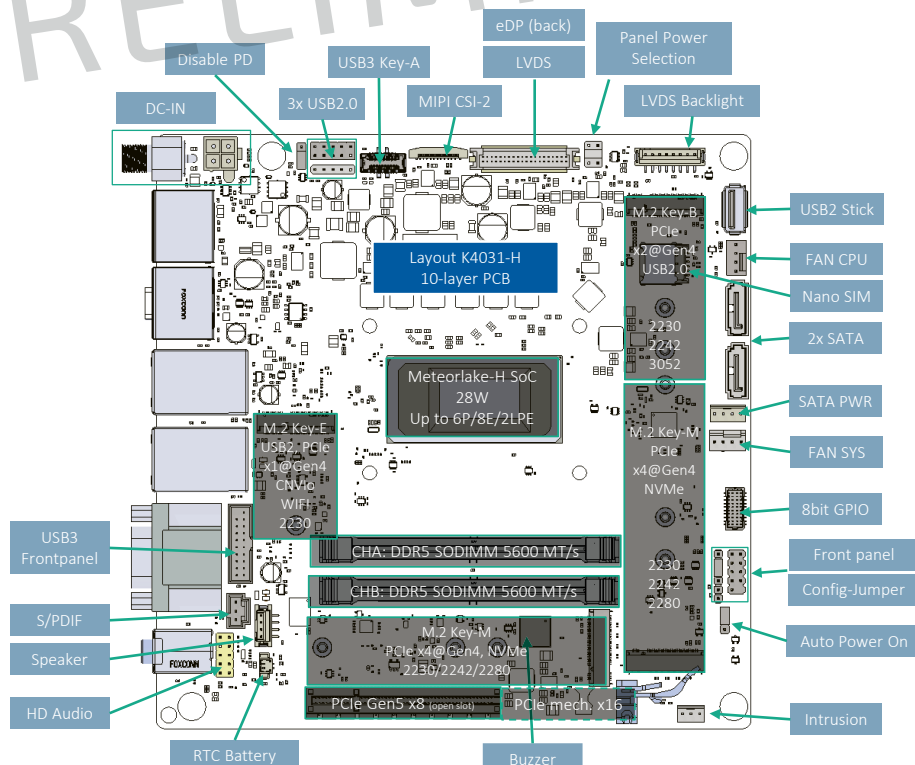
2) Stereo speaker support; 2 W @4Ω

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 35 W TDP (SoC)                                                        |
| AC-ADAPTER 20V/120W         | S26361-F5000-P007 | lockable connector                                                                           |
| SMARTCASE™ S7XX             | F5000-xxx         | 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

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