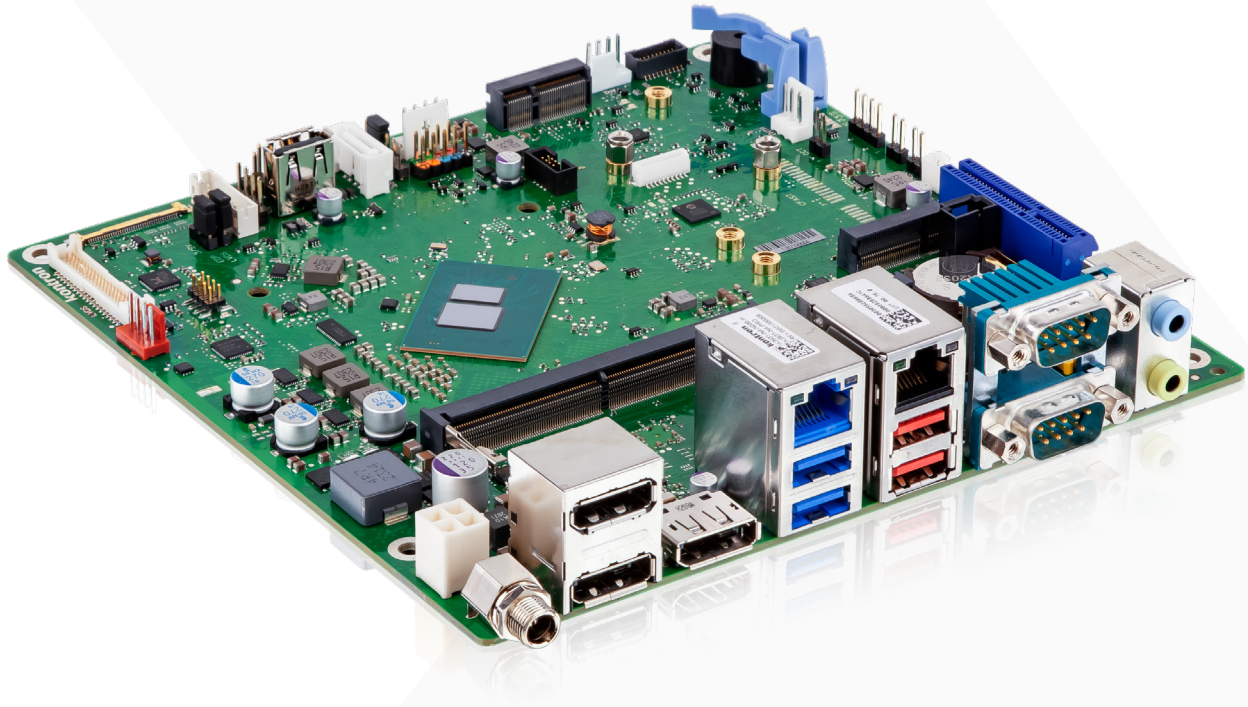


# K3931-N mITX

## Industrial Series



## Intel® Core™ i3 Processors & Intel® Processors N Series (Alder Lake N)

- › Latest DDR5 memory technology for best-in-class system performance
- › Intel® UHD Gen12 Graphics - driven by Intel® X<sup>e</sup> architecture (within SoC)
- › Up to 3x DisplayPort V1.4
- › Dual Channel LVDS (24 Bit) and eDP V1.4b (4 K) onboard
- › Designed for fanless operation

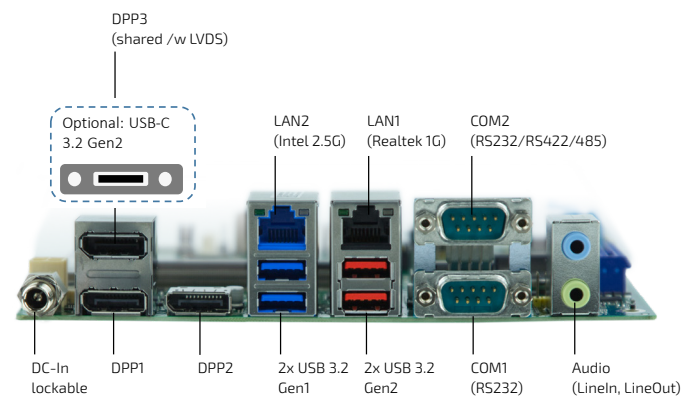
## K3931-N mITX Industrial Series

The Industrial Motherboard K3931-N mITX supports the Intel® Core™ i3 and Intel® Processor series (Alder Lake N) with latest UHD Gen12 graphics based on Intel® Xe architecture. It is equipped with three DisplayPorts, one embedded DisplayPort and one Dual-Channel LVDS (24bit) and supports three independent displays with up to 3x 4K resolution. It is also equipped with

extension slots for PCIe and two M.2 connectors, and offers many other functions like GPIO, four COM ports, one ccTalk port and USB 3.2 Gen2. Designed and approved for 24/7 continuous operation and an enhanced temperature range up to 60 °C the K3931-N mITX fits perfectly with special requirements of certain markets.

- Intel® Core™ i3/Processor series (Alder Lake N)
- cTDP – Easy & flexible reduction of CPU TDP down to 6 W
- DDR5-4800 SODIMM, max 32 GByte
- Intel® UHD Gen12 Graphics (within SoC)
- Up to 3x DisplayPort V1.4a
- Dual Channel LVDS (24 bit) and eDP V1.4b
- PCI Express® x1 (Gen3, mechanical x4)
- 8 Bit GPIO & HD Audio onboard
- 3x USB 2.0, 4x USB 3.2 Gen1, 4x USB 3.2 Gen2
- Internal USB 3.2 Gen2 Key-A for USB-C extension cable
- Internal USB2 Stick socket
- 1x Realtek GbE LAN, 1x 2.5GbE incl. Teaming
- 1x SATA 6G
- 1x M.2 2230/2242/2280 (Key-M, PCIe x2 Gen3/NVMe SSD modules)
- 1x M.2 2242/2280 (Key-B, PCIe x1 Gen3/SATA SSD modules)
- 1x M.2 2230 (Key-E, WLAN/Bluetooth modules, CNVi support only)

- Intel® integrated iTPM V2.0
- 4x RS-232 support onboard (1x incl. RS485/422) + 1x ccTalk
- HW Watchdog onboard
- WideRange internal/external DC input (8 V – 34 V)



## Technical Information

|                       |                                |                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYSTEM                | PROCESSOR                      | Intel® Alder Lake N SoC series<br>N1: Intel® Processor N50 (2C/6W) SoC<br>N2: Intel® Processor N97 (4C/12W) SoC<br>N4: Intel® Processor N200 (4C/6W) SoC<br>N6: Intel® Core™ i3 N305 (8C/15W) SoC<br>DDR5 4800 SDRAM<br>1x SO DIMM socket, up to 32 GByte memory, non-ECC                                                                                                                              |
|                       | MEMORY                         |                                                                                                                                                                                                                                                                                                                                                                                                        |
| VIDEO                 | GRAPHICS                       | Intel® UHD Graphics driven by Intel® Xe with up to 32 execution units (EUs)<br>Up to 3x DPP V1.4a (up to 4K resolution <sup>1)</sup> )<br>1x Embedded DP (eDP V1.4b up to 4K resolution <sup>2)</sup> )<br>1x Dual-Channel 24bit LVDS                                                                                                                                                                  |
| AUDIO                 | AUDIO CODEC<br>AUDIO INTERFACE | Following max. display combinations are supported:<br>3x DPP / 2x DPP + LVDS or eDP / 1x DPP + eDP + LVDS<br><br>Realtek ALC256<br>Stereo <sup>3</sup> , High Definition Audio Codec                                                                                                                                                                                                                   |
| NETWORK CONNECTION    | ETHERNET 1                     | Realtek RTL8111H with 10/100/1000 MBit/s,<br>Wake-on-LAN (WoL) by interesting Packets, Link Status Change and Magic Packet™, PXE Support, BIOS MAC Address Display, Teaming Support<br>Intel® i226LM with 10/100/1000/2500 MBit/s, TSN Support, Wake-on-LAN (WoL) by interesting Packets, Link Status Change and Magic Packet™, PXE Support, BIOS MAC Address Display, Teaming Support                 |
|                       | ETHERNET 2                     |                                                                                                                                                                                                                                                                                                                                                                                                        |
| PERIPHERAL CONNECTION | USB                            | 3x USB 2.0 (by header), 1x USB 2.0 stick socket<br>2x USB 3.2 Gen1 (Rear), 2x USB 3.2 Gen1 (by header)<br>2x USB 3.2 Gen2 (Rear), 1x USB 3.2 Gen2 Key A (header) for USB3 Type-C option<br>1x RS232/422/485; 3x RS232, 1x ccTalk (2x RearIO, 3x by header)<br>8 Bit GPIO (by header); WLAN LED support, WLAN enable/disable support<br>3.3 V/5 V/12 V supply voltage output; SMBus controller PCA9554A |
|                       | SERIAL PORT<br>OTHER I/Os      |                                                                                                                                                                                                                                                                                                                                                                                                        |

1) 3x 4K support only with K39xx-N2 (N97). All other boards: 2x 4K + 1x FHD  
2) 4K Resolution on eDP only with K39xx-N2 (N97)

|                     |                                    |                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STORAGE & EXPANSION | SATA<br>PCIe/M.2 SLOTS             | 1x Serial ATA III 600 Interface (up to 6Gbit/s), NCQ, AHCI,<br>1x M.2 PCIe 2230/2242/2280 (Key-M, PCIe x2 Gen3/NVMe SSD modules)<br>1x M.2 PCIe 2242/2280 (Key-B, PCIe x1 Gen3/USB/SATA SSD modules)<br>1x M.2 PCIe 2230 (Key-E, WLAN CNVi only/Bluetooth USB modules)<br>1x PCIe x4 (1 lane, Gen3, open slot)                                                                                                        |
| POWER               | CONNECTOR<br>INPUT VOLTAGE         | External/Internal DC-In (DC Jack/4-Pin Mini-Fit)<br>DC Input 8 V - 34 V (max. 10 A/max. 130 W)                                                                                                                                                                                                                                                                                                                        |
| FIRMWARE            | BIOS                               | AMI Aptio 5.x (UEFI) BIOS<br>modified and adapted by Kontron; Recovery BIOS, SM-BIOS (DMI), BIOS and<br>CPU Microcode Update, Quick Boot, Logo Boot, Quiet Boot, Plug & Play,<br>Automatic DRAM and PCIe Configuration, BIOS Support for S.M.A.R.T.,<br>Advanced Power Management, ACPI S3/S4, Wake on time from S5.<br>No legacy OS support, no MBR installation (UEFI only)<br>BIOS POST-/BIOS BOOT-/OS-HW Watchdog |
| SYSTEM CONTROL      | WATCHDOG<br>REAL TIME CLOCK<br>TPM | Integrated<br>TPM V2.0 (Intel® integrated)                                                                                                                                                                                                                                                                                                                                                                            |
|                     | FP HEADER<br>SECURITY              | 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>EraseDisk (BIOS Feature), Intel integrated TPM V2.0                                                                                                                                                        |
| COOLING             | FAN                                | 2x PWM fan (CPU/System)                                                                                                                                                                                                                                                                                                                                                                                               |
| SOFTWARE            | OS SUPPORT                         | MS Windows 10, MS Windows 11, MS Windows 10 IoT, 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<br>SAFETY                      | CE Class B, Industrial Immunity (EN 61000-6-2), FCC-B/ICES-003 verified, UKCA<br>cTUVus acc. IEC62368-1                                                                                                                                                                                                                                                                                                               |

## Motherboard Versions

|          | PROCESSOR (SoC)                                                                                                          | GRAPHICS<br>Intel® UHD Gen12 Gfx                                   | MEMORY                                   |
|----------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------|
| K3931-N6 | Intel® Core™ i3 N305<br>Octa-Core @ 15 W TDP (Flex cTDP option**)<br>TDP 15 W: 1.8/3.8/3 GHz*<br>TDP 9 W: 1.0/3.8/3 GHz* | GPU @ 1/1.25 GHz<br>32x EU<br>Up to 3 displays (2x 4K + 1x FHD)    | DDR5-4800<br>One socket<br>Max. 32 Gbyte |
| K3931-N4 | Intel® Processor N200<br>Quad-Core @ 6 W TDP<br>1.0/3.7/3.2 GHz*                                                         | GPU @ 0.45/0.75 GHz<br>32x EU<br>Up to 3 displays (2x 4K + 1x FHD) | DDR5-4800<br>One socket<br>Max. 32 Gbyte |
| K3931-N2 | Intel® Processor N97<br>Quad-Core @ 12 W TDP (Flex cTDP option**)<br>2.0/3.6/2.9 GHz*                                    | GPU @ 0.85/1.2 GHz<br>24x EU<br>Up to 3 displays (3x 4K)           | DDR5-4800<br>One socket<br>Max. 32 Gbyte |
| K3931-N1 | Intel® Processor N50<br>Dual-Core @ 6 W TDP<br>1.0/3.4/3.4 GHz*                                                          | GPU @ 0.6/0.75 GHz<br>16x EU<br>Up to 3 displays (2x 4K + 1x FHD)  | DDR5-4800<br>One socket<br>Max. 32 Gbyte |

\*) Base Frequency / 1 core Turbo / Multi core Turbo

\*\*) cTDP – Easy & flexible reduction of CPU TDP down to 6 W

## Power Supply Requirements

| SOURCE                | VOLTAGE RANGE                                                                              | MIN. PS LOAD | MAX. VOLTAGE<br>TOLERANCE | TYP. MOTHERBOARD<br>INPUT POWER <sup>1</sup> | MAX. MOTHERBOARD<br>INPUT POWER <sup>2</sup> |
|-----------------------|--------------------------------------------------------------------------------------------|--------------|---------------------------|----------------------------------------------|----------------------------------------------|
| DC-IN<br>(wide range) | 8 V - 34 V<br>(recommended nominal<br>range)<br>7.6 V - 36 V<br>(absolute maximum ratings) | 0 A          | ± 5 %                     | <10 W / 25 W                                 | 130 W                                        |

1) Motherboard incl. Memory and M.2 NVMe SSD (approximations for MS Windows 10 Idle Mode / Full Processor Load @ 15 W TDP)

2) 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/> DPP / 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 / 2.5GbE LAN<br/> WoL / PXE / LAN Teaming / TSN<br/> SATA / SATA RAID / M.2 (SATA) / M.2 (PCIe/NVME)<br/> USB 2.0 / USB 3.2 (Gen1) / USB 3.2 (Gen2) / USB 3.2 (Gen2) Type-C<br/> FAN monitored &amp; controlled CPU / AUX1 / AUX2<br/> TEMP monitored CPU / onboard sensors / external sensor</p>                                                                                                                                                                                                                                                                                                                                                   | <p>Intel® Alderlake-N SoC<br/> + / - / + / +<br/> + / 0<sup>1</sup> / +<br/> + / +<br/> + / - / +<br/> + / + / + / +<br/> + / - / + / +<br/> + / + / + / 0<sup>3</sup><br/> + / + / -<br/> + / + / -</p> |
| <b>SPECIAL FEATURES</b>    | <p>COM interface support for RS-232 / RS-485 / RS-422<br/> Silent Fan / System Guard<br/> Recovery BIOS / Flash Update / Multi Boot<br/> HDD Password / EraseDisk / TPM V2.0 onboard / optional TPM module<br/> BIOS POST- / BIOS Boot- / OS- HW Watchdog<br/> Operating Mode 24-7 / 8-5 (hrs per day - days per week)<br/> Motherboard operating temperature range (chassis inside)<sup>4</sup></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>+<br/> + / +<br/> + / + / +<br/> + / + / + / -<br/> + / + / +<br/> + / -<br/> 0 °C ... +60 °C</p>                                                                                                     |
| <b>INTERNAL CONNECTORS</b> | <p>SO DIMM Sockets (DDR5 4800)<br/> PCI Express® x4: 1 lanes, Gen3 / Mini-PCIe<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<sup>5</sup><br/> USB 3.2 Gen1 pin header (2 ports)<sup>6</sup> / USB 3.2 Gen2 Key A header<sup>3</sup><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)<br/> SATA Drive Power Connector (5 V/12 V) / DC-In Connector 8-34 V (4 pin)</p> | <p>1<br/> 1 / -<br/> 1 / 1 / 1<br/> 1<br/> 1 / 1<br/> 1 / 1 / 1<br/> 1 / 1<br/> 2 / 1 / -<br/> 1 / 1 / 1<br/> - / 1 / 1<br/> 1 / 1 / 1<br/> 1 / -<br/> 1<br/> 1 / 1</p>                                  |
| <b>EXTERNAL CONNECTORS</b> | <p>DisplayPort V1.4 / HDMI / DVI / VGA<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) 8-34 V @ 10 A max.; lockable<br/> Serial COM interface<sup>7</sup></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>3 / - / - / -<br/> - / 1 / 1<br/> 2 / - / -<br/> 0 / 2 / 2<br/> 1<br/> 2</p>                                                                                                                          |

1) Multichannel audio only via S/PDIF or DPP

2) Stereo speaker support; 2 W @4Ω

3) Type-C available via Adapter Cable

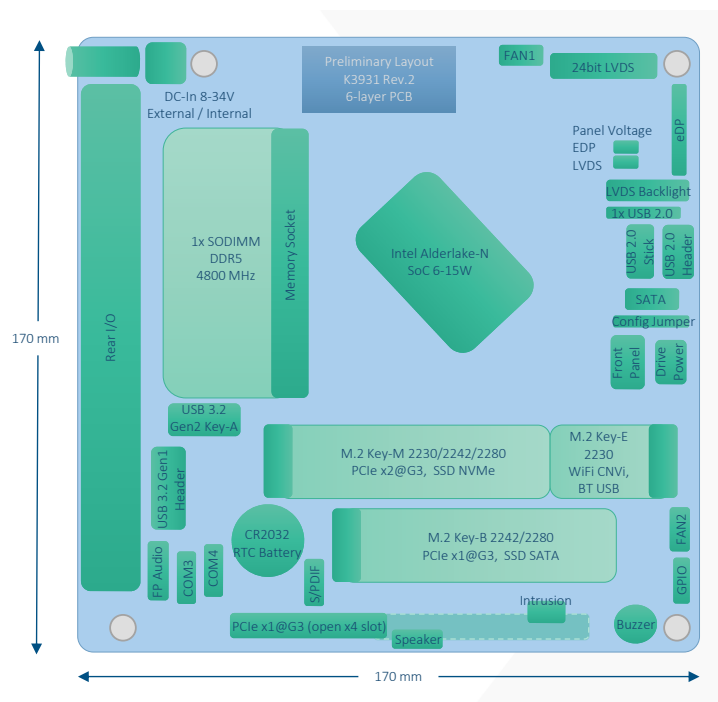
4) Forced cooling required for high operating temperature range. See TechNotes document for details

5) USB 2.0

6) USB3 connector includes separate USB 2.0 signal pins (2 channels)

7) RS-232; Thereof one port (COM2) supporting RS-232/RS-422/RS-485

## Connector/Socket Diagram



# Ordering Information

| ARTICLE       | PART NO.   | DESCRIPTION                     |
|---------------|------------|---------------------------------|
| K3931-N1 mITX | F5120-V211 | Intel® Processor N50 (2C, 6 W)  |
| K3931-N2 mITX | F5120-V212 | Intel® Processor N97 (4C, 12 W) |
| K3931-N4 mITX | F5120-V214 | Intel® Processor N200 (4C, 6 W) |
| K3931-N6 mITX | F5120-V216 | Intel® Core® i3 N305 (8C, 15 W) |

## Accessories

|                                  |                   |                                                          |
|----------------------------------|-------------------|----------------------------------------------------------|
| SLIM ACTIVE HEATSINK + BACKPLATE | F5000-C026        | max. 15 W TDP                                            |
| FANLESS HEATSINK + BACKPLATE     | F5000-C025        | max. 15 W TDP                                            |
| RISERCARD                        | S26361-F5000-R006 | 1x PCIe X4                                               |
| SERIAL PORT CABLE                | S26361-F5000-K010 | 400 mm, fullsize slot bracket                            |
| USB-C GEN2 REAR EXTENSION CABLE  | F5000-K013        | USB 3.2 Gen2 adapter cable for internal USB Key-A socket |
| INTERNAL PSU KIT                 | S26361-F5000-P004 | 12 V/65 W, designed for SMARTCASE™ chassis               |
| AC-ADAPTER 19V/65W               | S26361-F5000-P006 | For applications up to 35 W TDP (SoC)                    |
| AC-ADAPTER 20V/120W              | S26361-F5000-P007 | lockable connector                                       |
| DRIVE POWER CABLE                | S26361-F5000-K001 | 400 mm, power connector for 1x SATA and 1x slimline DVD  |
| SMARTCASE™ S730                  | F5000-J012        | Chassis kit solution for D37x3 and K393x                 |

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