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® Xe architecture (within SoC)
- Up to 3x DisplayPort V1.4
- Dual Channel LVDS (24 Bit) and eDP V1.4b (4K) onboard
- Designed for fanless operation
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)
- 1x M.2 2230 (Key-E, WLAN/Bluetooth modules, lockable
- 1x M.2 2242/2280 (Key-B, PCIe x1 Gen3/SATA SSD modules)
- 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)
- DC-In 8-34V
- 4x RS-232 onboard (1x incl. RS485/422) + 1x ccTalk
- 8 Bit GPIO & HD Audio onboard
- 2x USB 3.2 Gen2 (Rear), 1x USB 3.2 Gen2 Key A (header) for USB3 Type-C option
- 2x USB 3.2 Gen1 (Rear), 2x USB 3.2 Gen1 (by header)
- 3x USB 2.0 (by header), 1x USB 2.0 stick socket
- 8 Bit GPIO (by header); WLAN LED support, WLAN enable/disable support
- 3.3 V/5 V/12 V supply voltage output; SMBus controller PCA9554A

**Product Highlights**

**K3931-N mITX Industrial Series**

**Technical Information**
Technical Information  
K3931-N mITX

STORAGE & EXPANSION

- SATA
- PCIe/M.2 SLOTS
  1x Serial ATA III 600 Interface (up to 6Gbit/s), NCQ, AHCI,
  1x M.2 PCIe x2 Gen3 (NVMe SSD modules)
  1x M.2 PCIe x4 Gen3 (NVMe SSD modules)
  1x M.2 PCIe x2 Gen3 (NVMe SSD modules)
  1x PCIe x1 (Gen2, open slot)

POWER

- CONNECTOR
- INPUT VOLTAGE
  External/Internal DC-In (DC Jack/4-Pin Mini-Fit)
  DC input 8 V - 34 V (max. 10 A / max. 130 W)

FIRMWARE

- BIOS
  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, Wake on time from S5.
  No legacy OS support, no MBR installation (UEFI only)
  BIOS POST-/BIOS BOOT-/OS-HW Watchdog
  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,
  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
  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
- EMC
- CE Class B, Industrial Immunity (EN 61000-6-2), FCC-B/ICES-003 verified, UKCA
  cTUVus acc. IEC62368-1
- SAFETY
- 1x Power Switch, 1x Power LED
- Recovery BIOS, System and BIOS Password, Boot Sequence Control,
  Serial-/USB-Port Access Protection, Write Protection for Flash BIOS,
  EraseDisk (BIOS Feature), Intel integrated TPM V2.0

CERTIFICATION

- EMCELECTICAL REQUIREMENTS

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>VOLTAGE RANGE</th>
<th>MIN. PS LOAD</th>
<th>MAX. VOLTAGE TOLERANCE</th>
<th>TYP. MOTHERBOARD INPUT POWER</th>
<th>MAX. MOTHERBOARD INPUT POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC-IN (wide range)</td>
<td>8 V - 34 V (recommended nominal range)</td>
<td>0 A</td>
<td>± 5 %</td>
<td>&lt;10 W / 25 W</td>
<td>130 W</td>
</tr>
<tr>
<td></td>
<td>7.6 V - 36 V (absolute maximum ratings)</td>
<td></td>
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</tr>
</tbody>
</table>

| *1) Base Frequency / 1 core Turbo / Multi core Turbo |
| ***) cTDP – Easy & flexible reduction of CPU TDP down to 6 W |

Motherboard Versions

<table>
<thead>
<tr>
<th>PROCESSOR (SoC)</th>
<th>GRAPHICS</th>
<th>MEMORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Core™ i3 N305 Octa-Core @ 15 W TDP (Flex cTDP option*)</td>
<td>GPU @ 1.25 GHz 32x EU</td>
<td>DDR5-4800 One socket Max. 32 Gbyte</td>
</tr>
<tr>
<td>K3931-N6</td>
<td>Intel® UHD Gen12 Gfx</td>
<td>Up to 3 displays (2x 4K + 1x FHD)</td>
</tr>
<tr>
<td>Intel® Processor N200 Quad-Core @ 6 W TDP 1.0/3.3/3.2 GHz*</td>
<td>GPU @ 0.45/0.75 GHz 32x EU</td>
<td>DDR5-4800 One socket Max. 32 Gbyte</td>
</tr>
<tr>
<td>K3931-N4</td>
<td>Up to 3 displays (2x 4K + 1x FHD)</td>
<td></td>
</tr>
<tr>
<td>Intel® Processor N97 Quad-Core @ 12 W TDP (Flex cTDP option”) 2.0/3.6/2.9 GHz*</td>
<td>GPU @ 0.85/1.2 GHz 24x EU</td>
<td>DDR5-4800 One socket Max. 32 Gbyte</td>
</tr>
<tr>
<td>K3931-N2</td>
<td>Up to 3 displays (3x 4K)</td>
<td></td>
</tr>
<tr>
<td>Intel® Processor N50 Dual-Core @ 6 W TDP 1.0/3.4/3.4 GHz*</td>
<td>GPU @ 0.6/0.75 GHz 16x EU</td>
<td>DDR5-4800 One socket Max. 32 Gbyte</td>
</tr>
<tr>
<td>K3931-N1</td>
<td>Up to 3 displays (2x 4K + 1x FHD)</td>
<td></td>
</tr>
</tbody>
</table>

Power Supply Requirements

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.
Technical Details

K3931-N mITX

FEATURES
- Chipset / SoC (APU)
- DPP / HDMI / LVDS / eDP
- Stereo Audio / 5.1 Multichannel Audio / Front Panel Audio
- Buzzer / int. Speaker Support (stereo)
- GbE LAN / Dual GbE LAN / 2.5GbE LAN
- WOL / PXE / LAN Teaming / TSN
- SATA / SATA RAID / M.2 (SATA) / M.2 (PCIe/NVMe)
- USB 2.0 / USB 3.2 (Gen1) / USB 3.2 (Gen2) / USB 3.2 (Gen2) Type-C
- FAN monitored & controlled CPU / AUX1 / AUX2
- TEMP monitored CPU / onboard sensors / external sensor

SPECIAL FEATURES
- COM interface support for RS-232 / RS-485 / RS-422
- Silent Fan / System Guard
- Recovery BIOS / Flash Update / Multi Boot
- HDD Password / EraseDisk / TPM V2.0 onboard / optional TPM module
- BIOS POST- / BIOS Boot- / OS- / HW Watchdog
- Operating Mode 24-7 / 8-5 (hrs per day - days per week)
- Motherboard operating temperature range (chassis inside): 0 °C ... +60 °C

INTERNAL CONNECTORS
- SO-DIMM Sockets (DDR5 4800)
- PCI Express® x4: 1 lanes, Gen3
- Mini-PCIe
- 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 Key A header
- Serial CDM header / CTalk header / Parallel Port header
- LVDS / LVDS Backlight / Embedded DisplayPort @ 4 lanes
- FAN PSU / CPU (PWM) / AUX1 (PWM)
- Intrusion (Case Open) / GPIO (B Bit) / SMBus
- Stereo Speaker header / Digital Mic header
- Front Panel (Power Switch, Reset Switch, LEDs, Intel 10 pin header)
- SATA Drive Power Connector (5 V/12 V) / DC-In Connector B-34 V (4 pin)

EXTERNAL CONNECTORS
- DisplayPort V1.4 / HDMI / DVI / VGA
- 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) B-34 V @ 10 A max., lockable
- Serial CDM interface

Connector/Socket Diagram

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

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## Ordering Information

### Accessories

<table>
<thead>
<tr>
<th>ARTICLE</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>K3931-N1 mITX</td>
<td>F5120-V211</td>
<td>Intel® Processor N50 (2C, 6 W)</td>
</tr>
<tr>
<td>K3931-N2 mITX</td>
<td>F5120-V212</td>
<td>Intel® Processor N97 (4C, 12 W)</td>
</tr>
<tr>
<td>K3931-N4 mITX</td>
<td>F5120-V214</td>
<td>Intel® Processor N200 (4C, 6 W)</td>
</tr>
<tr>
<td>K3931-N6 mITX</td>
<td>F5120-V216</td>
<td>Intel® Core® i3 N305 (8C, 15 W)</td>
</tr>
<tr>
<td>SLIM ACTIVE HEATSINK +</td>
<td>F5000-C026</td>
<td>max. 15 W TDP</td>
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<tr>
<td>BACKPLATE</td>
<td>F5000-C025</td>
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<tr>
<td>FANLESS HEATSINK +</td>
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<td>1x PCIe X4</td>
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<tr>
<td>BACKPLATE</td>
<td>S26361-F5000-K010</td>
<td>400 mm, full-size slot bracket</td>
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<tr>
<td>RISERCARD</td>
<td>F5000-K013</td>
<td>USB 3.2 Gen2 adapter cable for internal USB Key-A socket</td>
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<tr>
<td>USB-C GEN2 REAR EXTENSION CABLE</td>
<td>S26361-F5000-P004</td>
<td>12 V/65 W, designed for SMARTCASE™ chassis</td>
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<td>INTERNAL PSU KIT</td>
<td>S26361-F5000-P004</td>
<td>For applications up to 35 W TDP (SoC)</td>
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<td>AC-ADAPTER 19V/65W</td>
<td>S26361-F5000-P006</td>
<td>lockable connector</td>
</tr>
<tr>
<td>AC-ADAPTER 20V/120W</td>
<td>S26361-F5000-P007</td>
<td>400 mm, power connector for 1x SATA and 1x slimline DVD</td>
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<td>DRIVE POWER CABLE</td>
<td>S26361-F5000-K001</td>
<td>Chassis kit solution for D37x3 and K393x</td>
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<td>SMARTCASE™ 5730</td>
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### Global Headquarters

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