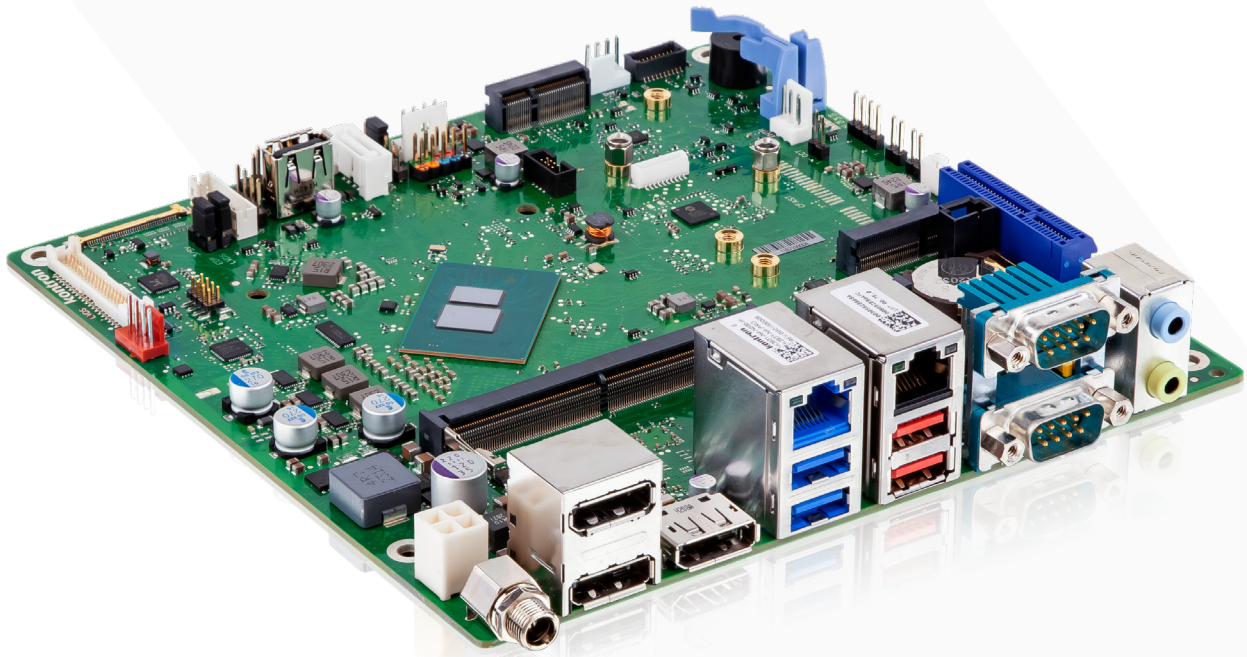
K3931-N mITX

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^e 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

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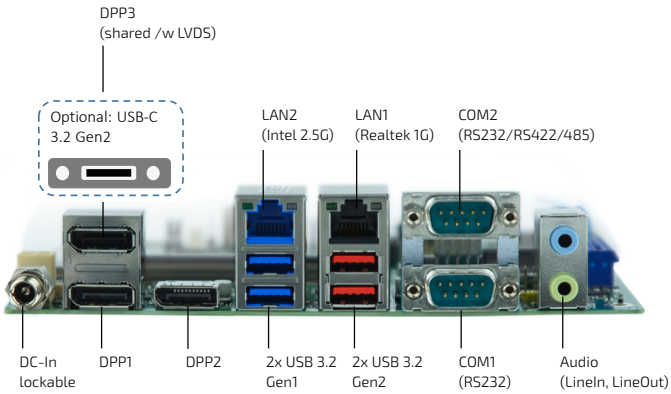
Product Highlights

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 N1: Intel® Processor N50 (2C/6W) SoC N2: Intel® Processor N97 (4C/12W) SoC N4: Intel® Processor N200 (4C/6W) SoC N6: Intel® Core™ i3 N305 (8C/15W) SoC
	MEMORY	DDR5 4800 SDRAM 1x SO DIMM socket, up to 32 GByte memory, non-ECC
VIDEO	GRAPHICS	Intel® UHD Graphics driven by Intel® Xᵉ with up to 32 execution units (EUs) Up to 3x DPP V1.4a (up to 4K resolution[1]) 1x Embedded DP (eDP V1.4b up to 4K resolution[2]) 1x Dual-Channel 24bit LVDS Following max. display combinations are supported: 3x DPP / 2x DPP + LVDS or eDP / 1x DPP + eDP + LVDS
AUDIO	AUDIO CODEC AUDIO INTERFACE	Realtek ALC256 Stereo[3], High Definition Audio Codec
NETWORK CONNECTION	ETHERNET 1	Realtek RTL8111H 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	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
PERIPHERAL CONNECTION	USB	3x USB 2.0 (by header), 1x USB 2.0 stick socket 2x USB 3.2 Gen1 (Rear), 2x USB 3.2 Gen1 (by header) 2x USB 3.2 Gen2 (Rear), 1x USB 3.2 Gen2 Key A (header) for USB3 Type-C option
	SERIAL PORT OTHER I/Os	1x RS232/422/485; 3x RS232, 1x ccTalk (2x RearIO, 3x by header) 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

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)

Technical Information

STORAGE & EXPANSION	SATA PCIe/M.2 SLOTS	1x Serial ATA III 600 Interface (up to 6GBit/s), NCQ, AHCI, 1x M.2 PCIe 2230/2242/2280 (Key-M ,PCIe x2 Gen3/NVMe SSD modules) 1x M.2 PCIe 2242/2280 (Key-B, PCIe x1 Gen3/USB/SATA SSD modules) 1x M.2 PCIe 2230 (Key-E, WLAN CNVi only/Bluetooth USB modules) 1x PCIe x4 (1 lane, Gen3, 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 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, 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
CERTIFICATION	EMC SAFETY	CE Class B, Industrial Immunity (EN 61000-6-2), FCC-B/ICES-003 verified, UKCA cTÜVus acc. IEC62368-1

Motherboard Versions

	PROCESSOR (SoC)	GRAPHICS Intel® UHD Gen12 Gfx	MEMORY
K3931-N6	Intel® Core™ i3 N305 Octa-Core @ 15 W TDP (Flex cTDP option**) TDP 15 W: 1.8/3.8/3 GHz* TDP 9 W: 1.0/3.8/3 GHz*	GPU @ 1/1.25 GHz 32x EU Up to 3 displays (2x 4K + 1x FHD)	DDR5-4800 One socket Max. 32 Gbyte
K3931-N4	Intel® Processor N200 Quad-Core @ 6 W TDP 1.0/3.7/3.2 GHz*	GPU @ 0.45/0.75 GHz 32x EU Up to 3 displays (2x 4K + 1x FHD)	DDR5-4800 One socket Max. 32 Gbyte
K3931-N2	Intel® Processor N97 Quad-Core @ 12 W TDP (Flex cTDP option**) 2.0/3.6/2.9 GHz*	GPU @ 0.85/1.2 GHz 24x EU Up to 3 displays (3x 4K)	DDR5-4800 One socket Max. 32 Gbyte
K3931-N1	Intel® Processor N50 Dual-Core @ 6 W TDP 1.0/3.4/3.4 GHz*	GPU @ 0.6/0.75 GHz 16x EU Up to 3 displays (2x 4K + 1x FHD)	DDR5-4800 One socket 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 TOLERANCE	TYP. MOTHERBOARD INPUT POWER[1]	MAX. MOTHERBOARD INPUT POWER[2]
DC-IN (wide range)	8 V - 34 V (recommended nominal range) 7.6 V - 36 V (absolute maximum ratings)	0 A	± 5 %	<10 W / 25 W	130 W

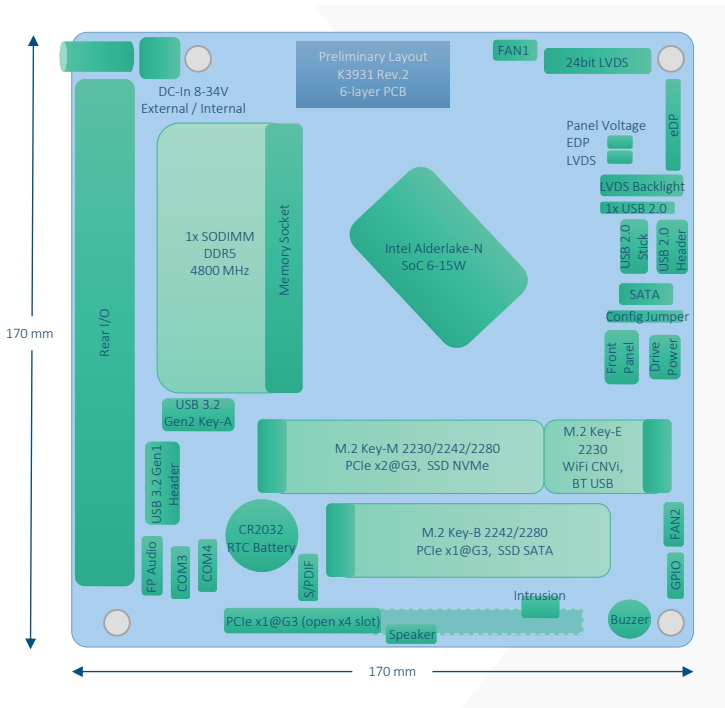
1) Motherboard incl. Memory and M.2 NVME SSD (approximations for MS Windows 10 Idle Mode / Full Processor Load @ 15 W TDP
2) Motherboard incl. Memory, M.2, PCIe/M.2 PCIe devices, USB
See TechNotes document for detailed power requirements

Technical Details

FEATURES	Chipset / SoC (APU) DPP / HDMI / LVDS / eDP Stereo Audio / 5.1 Multichannel Audio / Front Panel Audio Buzzer / int. Speaker Support (stereo)[2] 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	Intel® Alderlake-N SoC + / - / + / + + / 0[1] / + + / + + / - / + + / + / + / + + / - / + / + + / + / + / 0[3] + / + / - + / + / -
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)[4]	+ + / + + / + / + + / + / + / - + / + / + + / - 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[5] USB 3.2 Gen1 pin header (2 ports)[6] / USB 3.2 Gen2 Key A header[3] 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) SATA Drive Power Connector (5 V/12 V) / DC-In Connector 8-34 V (4 pin)	1 1 / - 1 / 1 / 1 1 1 / 1 1 / 1 / 1 1 / 1 2 / 1 / - 1 / 1 / 1 - / 1 / 1 1 / 1 / 1 1 / - 1 1 / 1
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) 8-34 V @ 10 A max.; lockable Serial COM interface[7]	3 / - / - / - - / 1 / 1 2 / - / - 0 / 2 / 2 1 2

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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