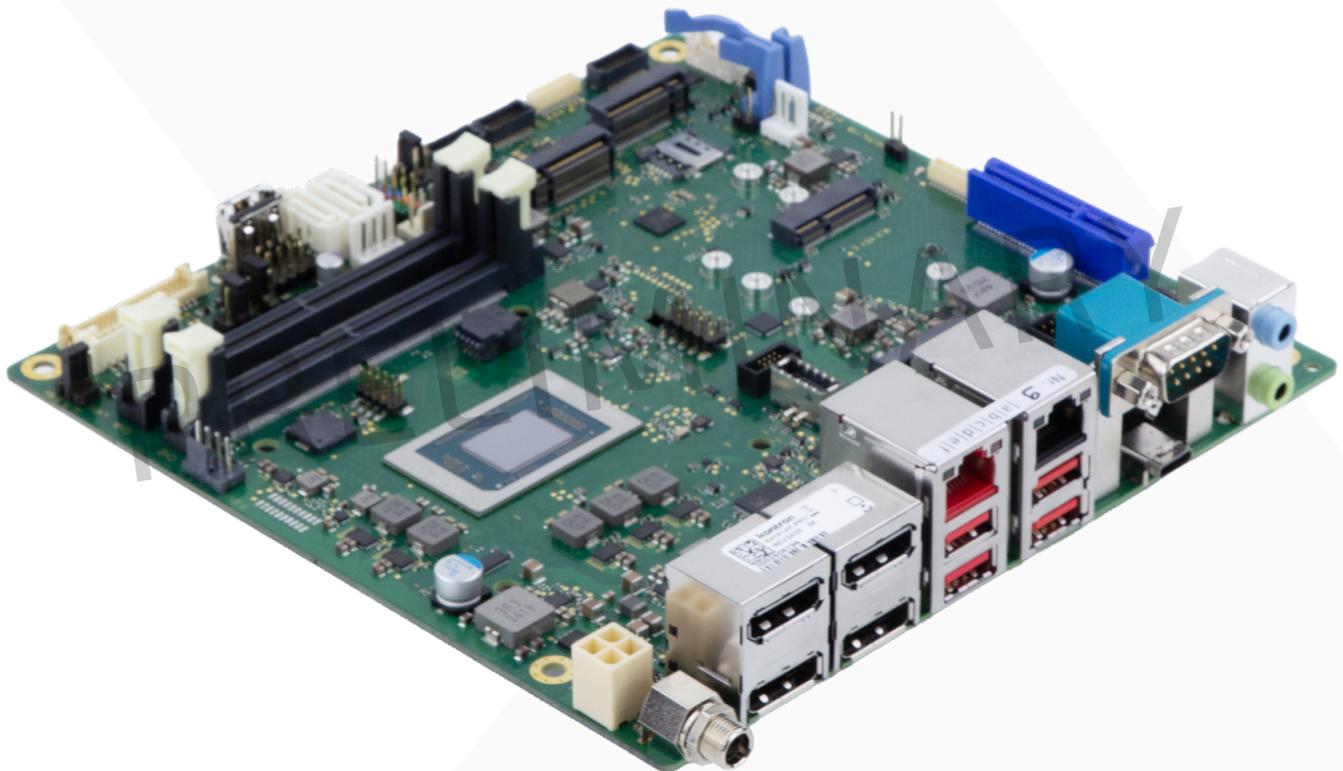# AMD Ryzen™ AI Embedded P100 Series

❯ AMD Radeon™ RDNA 3.5 Graphics (within SoC) with 4x DisplayPort V1.4, Dual Channel LDVS (24 Bit) and eDP V1.4b (4k) onboard

❯ XDNA™ 2 NPU delivering up to 50 TOPS of AI inference acceleration

❯ Dual LAN 1 GbE / 5 GbE incl. Teaming support

❯ Dual M.2-Key M, M.2 Key-B and M.2 Key-E sockets

❯ Powerful USB 4® (Type-C) and 3.2 Gen2 Ports

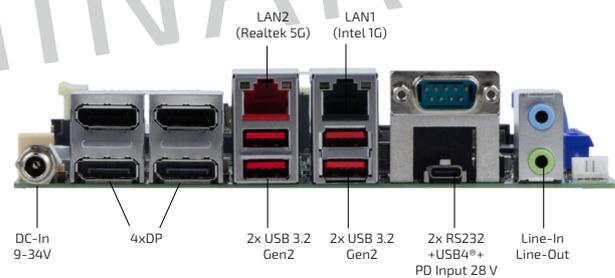❯ 6x COM

kontron

The Power of IoT

K4131-P mITX Industrial Series

The K4131-P mITX Industrial Motherboard is a compact, high-performance platform engineered for demanding embedded and industrial applications. Powered by the latest AMD Ryzen™ AI Embedded P100 series processors, it delivers outstanding computing performance and advanced graphics capabilities through AMD Radeon™ Graphics with RDNA 3.5. With support for up to four independent 4K120 or two 8K60 displays outputs, the K4131-P offers outstanding visual capabilities through a versatile mix of DisplayPort™, USB Type-C with 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, up to six COM ports, USB 3.2 Gen2 and USB4®. Built for 24/7 continuous operation and validated for enhanced temperature ranges up to 60 °C, the K4131-P is ideally suited for a wide range of vertical markets—from industrial automation to digital signage and medical systems.

❱ AMD Ryzen™ AI Embedded P100 series
❱ DDR5-5600 SODIMM, max 96 GByte
❱ AMD Radeon™ Graphics with RDNA 3.5
❱ 4x DisplayPort™ V1.4
❱ Up to 2x USB Type-C with USB4® or
   DP alt mode / USB 3.2 Gen2
❱ Dual Channel LVDS and eDP V1.4b
❱ 8 Bit GPIO & HD Audio onboard
❱ 4x USB3.2 Gen2 and 1x USB4®
❱ 1x Intel® 1GbE LAN,
   1x Realtek 5GbE incl. Teaming
❱ 2x SATA 6G
❱ 1x PCI Express® x4 (Gen4, open slot)
❱ 2x M.2 Key M x2 Gen4
❱ 1x M.2 Key B with 5G card support
❱ 1x M.2 Key E (WLAN)

❱ up to six RS-232 supported
❱ HW Watchdog onboard
❱ WideRange internal/external DC input 9-34V,
   PowerDelivery Sink Mode (up to 28V / 140W via Type-C)

PRELIMINARY

LAN2 (Realtek 5G)   LAN1 (Intel 1G)

DC-In 9-34V   4xDP   2x USB 3.2 Gen2   2x USB 3.2 Gen2   2x RS232 +USB4®+ PD Input 28 V   Line-In Line-Out

Technical Information

SYSTEM	PROCESSOR	AMD Ryzen™ AI Embedded P121
		AMD Ryzen™ AI Embedded P132
		AMD Ryzen™ AI Embedded P164
		AMD Ryzen™ AI Embedded P174
		AMD Ryzen™ AI Embedded P185
	AI CO-PROCESSOR	XDNA™ 2 NPU* delivering up to 50 TOPS of AI inference acceleration
	MEMORY	DDR5 5600 SDRAM
		2x SO DIMM socket, up to 96GByte memory with ECC
VIDEO	GRAPHICS	Integrated "RDNA 3.5" GPU with support of up to 8 WGP
		1x USB4® (DP2.1 up to UHBR20 8K)
		4x DPV1.4 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***
		Support for up to 4x 4K120 (or 2x 8K120) displays simultaneously
AUDIO	AUDIO CODEC	Realtek ALC897
	AUDIO INTERFACE	7.1 Channel, High Definition Audio Codec
NETWORK CONNECTION	ETHERNET 1	Intel® i210 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	2x USB 2.0 (by headers), 1x USB 2.0 Type-A stick socket
		1x USB-C with USB4 support
		4x USB3.2 Gen2 Type A, 2x USB3-2 Gen1 (by header)
	SERIAL PORT	1x RS-485/RS-422/RS-232, 5xRS-232, 1x ccTalk
	OTHER I/Os	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 AMD CPU
**) DPoC: DisplayPort over USB-Type-C (Alternate Mode)
***) Simultaneous use of LVDS and eDP is not supported..

STORAGE & EXPANSION	**SATA** **PCIe SLOT** **M.2 SLOTS**	2x Serial ATA III 600 Interface (up to 6GBit/s), NCQ, AHCI, RAID0+1 1x PCIe x4 (4 lanes, Gen4, open slot for x16 card support) 1x M.2 2230/ 2242 /2280 (Key-M, PCIe x2/Gen4/NVME SSD modules) 1x M.2 2230/ 2242 (Key-M, PCIe x2/Gen4/NVME SSD modules) 1x M.2 2230/ 2242 /3052 (Key-B, PCIe x2/ USB2 /5G modules) Nano SIM socket for 5G module 1x M.2 2230 (Key-E, WLAN/Bluetooth modules, PCIe/USB
POWER	**CONNECTOR** **INPUT VOLTAGE** **OUTPUT VOLTAGE**	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)
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 (planned), Wake on time from S5. Programmable 3-stage Watchdog to generate system reset event Integrated TPM Header for external modules
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, Downflash protection, UEFI Secure Boot, EraseDisk (BIOS Feature)
COOLING	**FAN**	2x PWM fan (CPU/System)
SOFTWARE	**OS SUPPORT**	MS Windows® 11, MS Windows® 11 IoT (LTSC), 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**	Planned: cTÜVus acc. IEC62368-1, CE Class B incl. Industrial Immunity, UKCA, FCC-B verified

Motherboard Versions

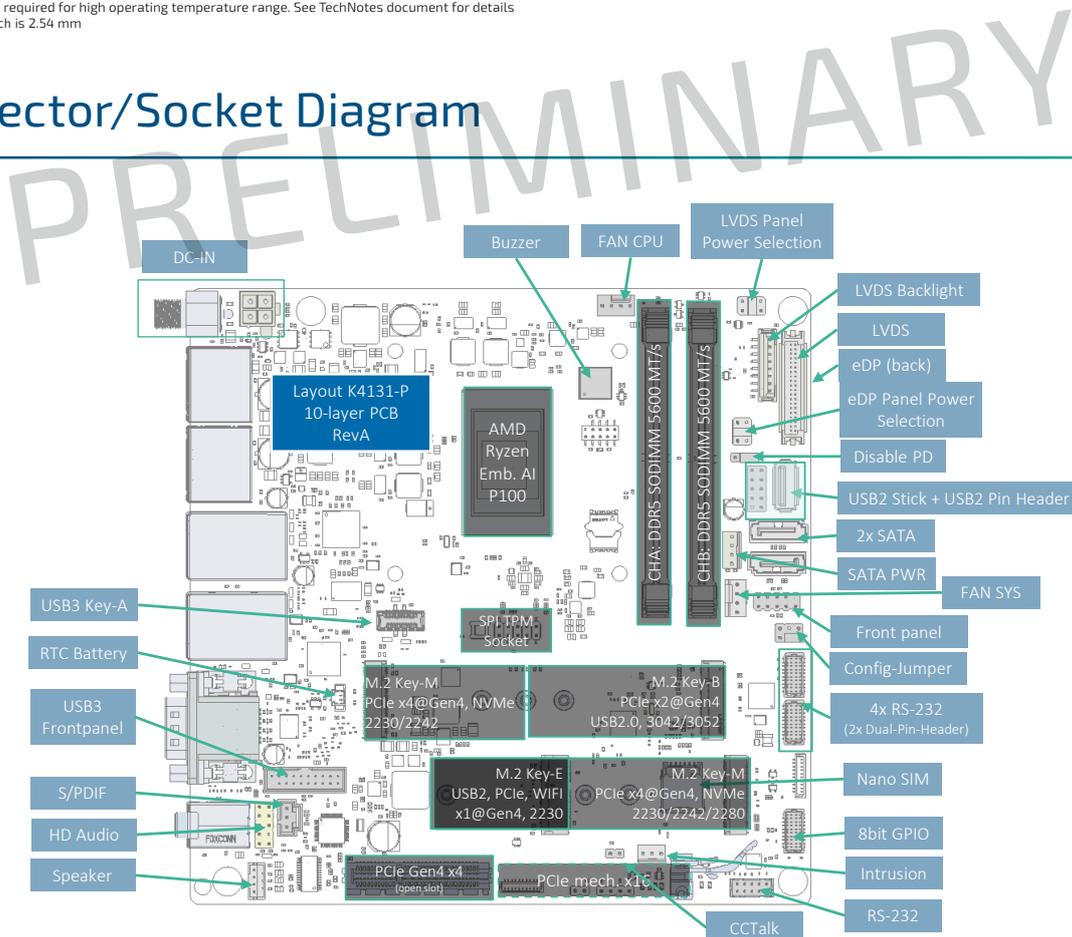|	PROCESSOR (SoC)	GRAPHICS AMD Radeon™ graphics	MEMORY
K4131-P2	AMD Ryzen™ AI Embedded P121 4-Core @28W TDP 4,4 GHz	GPU@2,7GHz	DDR5-5600 Two sockets Max. 96GB
K4131-P3	AMD Ryzen™ AI Embedded P132 6-Core @28W TDP 4,5 GHz	GPU@2,8GHz	DDR5-5600 Two sockets Max. 96GB
K4131-P6	AMD Ryzen™ AI Embedded P164	tbd	DDR5-5600 Two sockets Max. 96GB
K4131-P7	AMD Ryzen™ AI Embedded P174	tbd	DDR5-5600 Two sockets Max. 96GB
K4131-P8	AMD Ryzen™ AI Embedded P185	tbd	DDR5-5600 Two sockets Max. 96GB

Power Supply Requirements

SOURCE	VOLTAGE RANGE	MIN. PS LOAD	MAX. VOLTAGE TOLERANCE	TYP. MOTHERBOARD INPUT POWER[1]	MAX. MOTHERBOARD INPUT POWER[2]
DC-IN (WideRange)	9 V - 34 V (recommended nominal range)	0 A	8.5 V - 36 V (absolute maximum ratings)	to be measured	140 W (external or internal DC-In)
PowerDelivery (PD3.1 EPR) via Rear USB-C	up to 28V PD Sink	0 A	28V: +-5%	to be measured	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

Technical Details

FEATURES		AMD Ryzen™ AI Embedded P100 Series
	Chipset / SoC (APU)	
	DP / HDMI / LVDS / eDP	+ / - / + / +
	Stereo Audio / 7.1 Multichannel Audio / Front Panel Audio	+ / + / +
	Buzzer /int. Speaker support (stereo)[2]	+ / +
	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 / USB 4® 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	+ / + / +
	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)[3]	0 °C … +60 °C
INTERNAL CONNECTORS		
	SO DIMM Sockets (DDR5 5600)	2
	SATA-III / M.2 Key-M SSD / M.2 Key-B	2 / 2 / 1
	M.2 2230 (Key-E for WLAN/Bluetooth)	1
	Front Panel Audio (9-Pin, HD Audio) / S/PDIF Out (Digital Audio)	1 / 1
	USB 2.0 pin header (2 port) / USB 2.0 single port header / USB Stick socket	1 / 0 / 1
	USB 3.2 Gen1 pin header (2 ports) / USB 3.2 Gen2 Type A header	1 / 1
	Serial COM header / CCTalk header / Parallel Port header	5 / 1 / 0
	LVDS / LVDS Backlight / Embedded DisplayPort @ 4 lanes	1 / 1 / 1
	FAN PSU / CPU (PWM) / AUX1 (PWM)	- / 1 / 1
	Intrusion (Case Open) / GPIO (8 Bit) / SMBus	1 / 1 / 1
	Stereo Speaker header / Digital Mic header	1 / -
	Front Panel (Power Switch, Reset Switch, LEDs, Intel 10 pin header)[4]	1
	SATA Drive Power Connector (5 V/12 V) / DC-In Connector (4 pin)	1 / 1
EXTERNAL CONNECTORS		
	HDMI / DVI / VGA	- / - / -
	DisplayPort / USB Type-C Alternate Mode (DPoC) / USB4®	4 / 1 / 1
	Audio Mic. In / Line in / Line out (or driver configuration)	0 / 1 / 1
	LAN (RJ-45) / PS/2 Keyboard / Mouse	2 / - / -
	USB 2.0 / USB 3.2 Gen1 / USB 3.2 Gen2 / USB 4®	0 / 0 / 4 / 1
	DC-In connector (external input) 5.5/2.5mm / lockable.	1 / +
	Serial COM interface	1

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

Connector/Socket Diagram

ARTICLE	PART NO.	DESCRIPTION
K4131-P2	F5120-V272	AMD Ryzen™ AI Embedded P121
K4131-P3	F5120-V273	AMD Ryzen™ AI Embedded P132
K4131-P6	F5120-V276	AMD Ryzen™ AI Embedded P164
K4131-P7	F5120-V277	AMD Ryzen™ AI Embedded P174
K4131-P8	F5120-V278	AMD Ryzen™ AI Embedded P185

Accessories

ACTIVE HEATSINK + BACKPLATE	S26361-F5000-C020 S26361-F5000-C021	max. 54W TDP max. 35W TDP
FANLESS HEATSINK + BACKPLATE	S26361-F5000-C019	max. 15W 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™ S7XX	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
SERIAL PORT CABLE	S26361-F5000-K010	Internal COM Port Connector Cable, Length=400mm. Standard PCI slot bracket included.
DUAL SERIAL PORT CABLE	F5000-K022	Dual Serial Port Cable for K1202-A Add On, Length=400mm. Standard PCI slot bracket included.

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