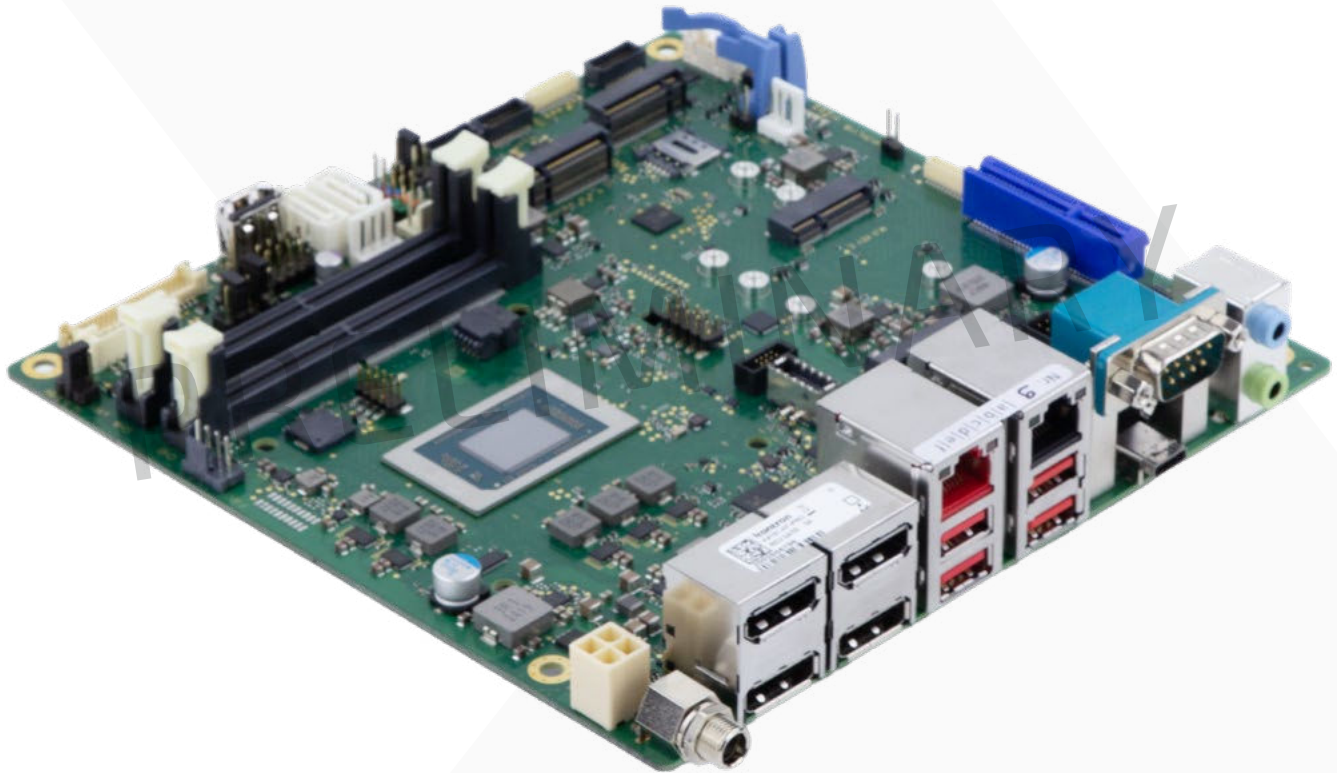


# K4131-P mITX

## Industrial Series



## AMD Ryzen™ AI Embedded P100 Series

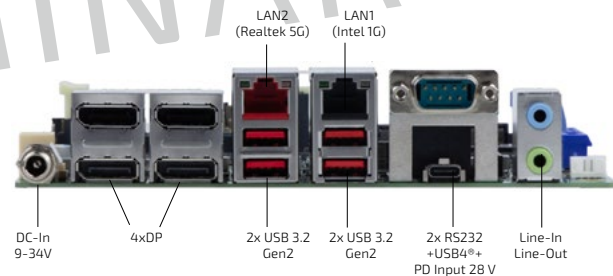
- AMD Radeon™ RDNA 3.5 Graphics (within SoC) with 4x DisplayPort V1.4, Dual Channel LDVS (24 Bit) and eDP V1.4b (4k) onboard
- XDNA™ 2 NPU delivering up to 50 TOPS of AI inference acceleration
- Dual LAN 1 GbE / 5 GbE incl. Teaming support
- Dual M.2-Key M, M.2 Key-B and M.2 Key-E sockets
- Powerful USB 4® (Type-C) and 3.2 Gen2 Ports
- 6x COM

## 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)



## Technical Information

|                       |                                |                                                                                                                                                                                                                                                                                            |
|-----------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYSTEM                | PROCESSOR                      | AMD Ryzen™ AI Embedded P121<br>AMD Ryzen™ AI Embedded P132<br>AMD Ryzen™ AI Embedded P164<br>AMD Ryzen™ AI Embedded P174<br>AMD Ryzen™ AI Embedded P185                                                                                                                                    |
|                       | AI CO-PROCESSOR<br>MEMORY      | XDNA™ 2 NPU* delivering up to 50 TOPS of AI inference acceleration<br>DDR5 5600 SDRAM<br>2x SO DIMM socket, up to 96GByte memory with ECC                                                                                                                                                  |
| VIDEO                 | GRAPHICS                       | Integrated "RDNA 3.5" GPU with support of up to 8 WGP<br>1x USB4® (DP2.1 up to UHBR20 8K)<br>4x DPV1.4 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>Support for up to 4x 4K120 (or 2x 8K120) displays simultaneously |
| AUDIO                 | AUDIO CODEC<br>AUDIO INTERFACE | Realtek ALC897<br>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<br>1x USB-C with USB4 support<br>4x USB3.2 Gen2 Type A, 2x USB3-2 Gen1 (by header)<br>1x RS-485/RS-422/RS-232, 5xRS-232, 1x ccTalk                                                                                                 |
|                       | SERIAL PORT<br>OTHER I/Os      | 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                                                                                                                                                                          |

\*) 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<br>PCIe SLOT<br>M.2 SLOTS                              | 2x Serial ATA III 600 Interface (up to 6Gbit/s), NCQ, AHCI, RAID0+1<br>1x PCIe x4 (4 lanes, Gen4, open slot for x16 card support)<br>1x M.2 2230/ 2242 /2280 (Key-M, PCIe x2/Gen4/NVME SSD modules)<br>1x M.2 2230/ 2242 (Key-M, PCIe x2/Gen4/NVME SSD modules)<br>1x M.2 2230/ 2242 /3052 (Key-B, PCIe x2/ USB2 /5G modules)<br>Nano SIM socket for 5G module<br>1x M.2 2230 (Key-E, WLAN/Bluetooth modules, PCIe/USB)                         |
| POWER               | CONNECTOR<br>INPUT VOLTAGE<br><br>OUTPUT VOLTAGE            | External/Internal DC-In (DC Jack/4-Pin Mini-Fit)<br>DC Input 9-34V, max. 10A (internal or external connector)<br>PowerDelivery (PD3.1 EPR) via Rear USB-C (max. 28V, 5A)<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<br>Integrated<br>TPM Header for external modules |
| SYSTEM CONTROL      | WATCHDOG<br>REAL TIME CLOCK<br>TPM<br>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>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),<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>AMD Radeon™ graphics | MEMORY                                |
|----------|--------------------------------------------------------|----------------------------------|---------------------------------------|
| K4131-P2 | AMD Ryzen™ AI Embedded P121<br>4-Core @28W TDP 4,4 GHz | GPU@2,7GHz                       | DDR5-5600<br>Two sockets<br>Max. 96GB |
| K4131-P3 | AMD Ryzen™ AI Embedded P132<br>6-Core @28W TDP 4,5 GHz | GPU@2,8GHz                       | DDR5-5600<br>Two sockets<br>Max. 96GB |
| K4131-P6 | AMD Ryzen™ AI Embedded P164                            | tbd                              | DDR5-5600<br>Two sockets<br>Max. 96GB |
| K4131-P7 | AMD Ryzen™ AI Embedded P174                            | tbd                              | DDR5-5600<br>Two sockets<br>Max. 96GB |
| K4131-P8 | AMD Ryzen™ AI Embedded P185                            | tbd                              | DDR5-5600<br>Two sockets<br>Max. 96GB |

## 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)                     | 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

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FEATURES            | <p>Chipset / SoC (APU)</p> <p>DP / HDMI / LVDS / eDP</p> <p>Stereo Audio / 7.1 Multichannel Audio / Front Panel Audio</p> <p>Buzzer /int. Speaker support (stereo)<sup>2</sup></p> <p>GbE LAN / Dual GbE LAN / 2.5 GbE LAN / 5 GbE Lan</p> <p>WoL / PXE / LAN Teaming / TSN</p> <p>SATA / SATA RAID / M.2 (SATA) / M.2 (PCIe/NVME) / NVMe RAID</p> <p>USB 2.0 / USB 3.2 (Gen1) / USB 3.2 (Gen2)</p> <p>USB 3.2 (Gen2x2) Type-C / USB 4® Type-C</p> <p>FAN monitored &amp; controlled CPU / AUX1 / AUX2</p> <p>TEMP monitored CPU / onboard sensors / external sensor</p>                                                                                                                                                                                                                             | <p>Intel® Ryzen™ AI Embedded P100 Series</p> <p>+ / - / + / +</p> <p>+ / + / +</p> <p>+ / +</p> <p>+ / - / - / +</p> <p>+ / + / + / +</p> <p>+ / - / - / + / -</p> <p>+ / + / +</p> <p>- / +</p> <p>+ / + / -</p> <p>+ / + / -</p> |
| SPECIAL FEATURES    | <p>COM interface support for RS-232 / RS-485 / RS-422</p> <p>Fan configuration / System Monitoring</p> <p>Recovery BIOS / Flash Update / Multi Boot</p> <p>HDD Password / EraseDisk / TPM V2.0 onboard / optional TPM module</p> <p>Multi Stage Watchdog</p> <p>Operating Mode 24-7 / 8-5 (hrs per day - days per week)</p> <p>Motherboard operating temperature range (chassis inside)<sup>3</sup></p>                                                                                                                                                                                                                                                                                                                                                                                              | <p>+ / + / +</p> <p>+ / +</p> <p>+ / + / +</p> <p>+ / + / - / +</p> <p>+</p> <p>+ / -</p> <p>0 °C ... +60 °C</p>                                                                                                                   |
| INTERNAL CONNECTORS | <p>SO DIMM Sockets (DDR5 5600)</p> <p>SATA-III / M.2 Key-M SSD / M.2 Key-B</p> <p>M.2 2230 (Key-E for WLAN/Bluetooth)</p> <p>Front Panel Audio (9-Pin, HD Audio) / S/PDIF Out (Digital Audio)</p> <p>USB 2.0 pin header (2 port) / USB 2.0 single port header / USB Stick socket</p> <p>USB 3.2 Gen1 pin header (2 ports) / USB 3.2 Gen2 Type A header</p> <p>Serial COM header / CCTalk header / Parallel Port header</p> <p>LVDS / LVDS Backlight / Embedded DisplayPort @ 4 lanes</p> <p>FAN PSU / CPU (PWM) / AUX1 (PWM)</p> <p>Intrusion (Case Open) / GPIO (8 Bit) / SMBus</p> <p>Stereo Speaker header / Digital Mic header</p> <p>Front Panel (Power Switch, Reset Switch, LEDs, Intel 10 pin header)<sup>4</sup></p> <p>SATA Drive Power Connector (5 V/12 V) / DC-In Connector (4 pin)</p> | <p>2</p> <p>2 / 2 / 1</p> <p>1</p> <p>1 / 1</p> <p>1 / 0 / 1</p> <p>1 / 1</p> <p>5 / 1 / 0</p> <p>1 / 1 / 1</p> <p>- / 1 / 1</p> <p>1 / 1 / 1</p> <p>1 / -</p> <p>1</p> <p>1 / 1</p>                                               |
| EXTERNAL CONNECTORS | <p>HDMI / DVI / VGA</p> <p>DisplayPort / USB Type-C Alternate Mode (DPoC) / USB4®</p> <p>Audio Mic. In / Line in / Line out (or driver configuration)</p> <p>LAN (RJ-45) / PS/2 Keyboard / Mouse</p> <p>USB 2.0 / USB 3.2 Gen1 / USB 3.2 Gen2 / USB 4®</p> <p>DC-In connector (external input) 5.5/2.5mm / lockable.</p> <p>Serial COM interface</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>- / - / -</p> <p>4 / 1 / 1</p> <p>0 / 1 / 1</p> <p>2 / - / -</p> <p>0 / 0 / 4 / 1</p> <p>1 / +</p> <p>1</p>                                                                                                                     |

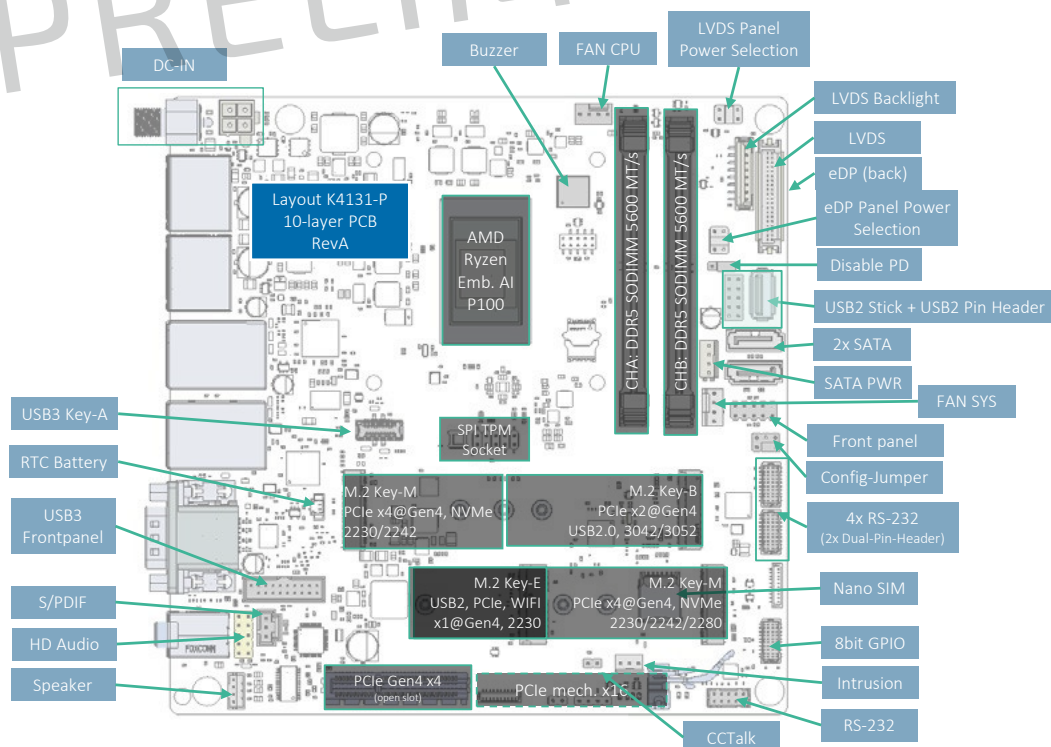
1) Multichannel audio only via S/PDIF or DisplayPort™

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

## 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 |

PRELIMINARY

## Accessories

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

## Global Headquarters

Kontron Europe GmbH

Gutenbergstraße 2  
85737 Ismaning, Germany  
Tel.: +49 821 4086-0  
info@kontron.com

www.kontron.com