CoreIPC

NUC16R-D5 User Manual

Issue 1.1

www.CoreIPC.com

Security Guidance

Copyright Statement

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- To help you use the CoreIPC motherboard, please read the [User Manual] carefully.
- For product-related information, please be sure to read these safety instructions carefully.
- Identifying the Product Version
  You can find the version of this motherboard labeled [Issue:X.X] on the motherboard itself. X.X represents a number; for example, a label reading [Issue1.0] indicates that the version of this motherboard is 1.0. Please note the product version when updating the motherboard's BIOS or drivers, or when referring to other technical documentation.

Basic Safety Tips

1. Before using this product, please be sure to read the product manual carefully.
2. Any cards not yet ready for installation should be stored in anti-static bags.
3. Before removing the board from the antistatic bag, place your hand on a grounded metal object for a moment (such as 10 seconds) to discharge any static electricity from your body and hands.
4. When handling circuit boards, you must wear anti-static gloves and make it a habit to touch only the edges.
5. To prevent electric shock or damage to the product, be sure to turn off the AC power before inserting, removing, or reconfiguring the board.
6. Before moving a board or the entire unit, you must first turn off the AC power.
7. For complete systems, be sure to turn off the AC power before adding or removing any boards.
8. Before connecting or disconnecting any device, you must first turn off the AC power.
9. To avoid unnecessary damage to the product caused by frequent power cycles, wait at least 30 seconds after turning it off before turning it back on.

Ordering Information

No.	Model	CPU	Core	Freq.	TDP	Memory	HDMI	DP	LAN	USB	PS2	LPT	COM/485	POWER
1	NUC16R-D5 VER1.1	N95	4	Up to3.4G	15W	DDR5	1	1	6	7	/	/	2 / 0	12V
2	NUC16R-D5 VER1.1	N100	4	Up to3.4G	6W	DDR5	1	1	6	7	/	/	2 / 0	12V
3	NUC16R-D5 VER1.1	N200	4	Up to3.7G	6W	DDR5	1	1	6	7	/	/	2 / 0	12V
4	NUC16R-D5 VER1.1	I3-N305	8	Up to3.8G	15W	DDR5	1	1	6	7	/	/	2 / 0	12V
5	NUC16R-D5 VER1.1	N150	4	Up to3.6G	6W	DDR5	1	1	6	7	/	/	2 / 0	12V
6	NUC16R-D5 VER1.1	N250	4	Up to3.8G	6W	DDR5	1	1	6	7	/	/	2 / 0	12V

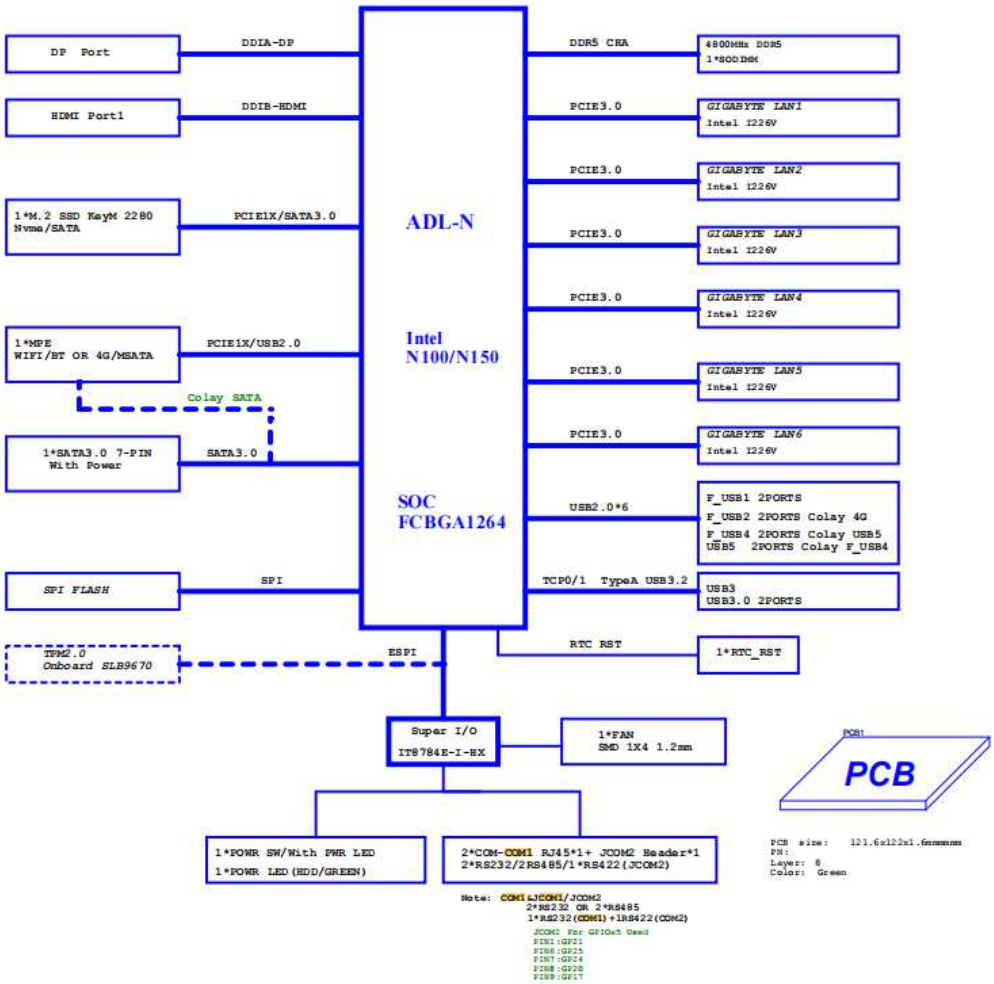
1. Product Description

NUC16R-D5 is a motherboard from the CoreIPC NANO Multi-LAN Series, supporting the full range of Intel® Alder Lake processors. It is widely suitable for applications such as soft routers, network security appliances, industrial control systems, cloud terminals, and other embedded computing solutions.

Key Features of the NUC16R-D5 Motherboard:

- Integrated Intel® Celeron® N100 quad-core processor with a base frequency of 0.8 GHz; compatible with the full range of Intel® Alder Lake-N and Twin Lake-N processors.
- 1 × SO-DIMM slot, supporting single-channel DDR5 4800 MHz memory, with a maximum capacity of 16 GB.
- Supports DP and HDMI display outputs.
- Supports up to 6 × Intel® I225-V or I226-V 2.5GbE LAN ports.
- Supports 1 × Mini PCIe slot for Wi-Fi / 4G modules and 1 × M.2 Key-M 2280/2242 slot supporting PCIe/SATA SSDs.
- Supports up to 2 × USB 3.0 ports and 5 × USB 2.0 ports.
- Equipped with 2 × RS232 serial ports, with optional support for 1 × RS485 or 1 × RS422 interface.
- Fanless cooling design, suitable for integration into a fully enclosed system for enhanced dust and moisture resistance.
- Supports a wide operating temperature range of -10°C to 60°C.
- Supports AT/ATX power-on mode switching and 12V DC power input.

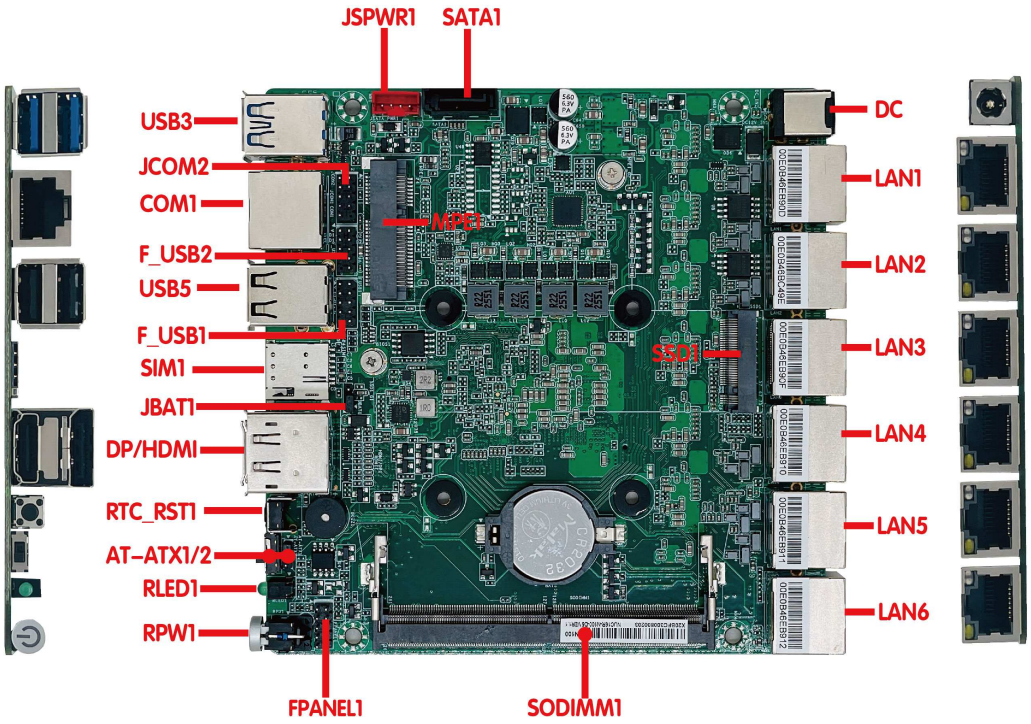
2. Motherboard Block Diagram



3. Motherboard Specifications

Item	Description
Processor	Integrated Intel® Celeron® N100 quad-core processor, 0.8 GHz, TDP 6W Compatible with Intel® Alder Lake-N and Twin Lake-N series processors
Memory	1 × SO-DIMM slot, single-channel DDR5 4800 MHz memory, up to 16 GB
Display	Integrated Intel® UHD Graphics
	1 × HDMI 1.4 port (4K @ 60 Hz), 1 × DP port (4K @ 60 Hz) Supports HDMI and DP simultaneous or independent display
Network	6 × Intel® I225 or I226 2.5GbE LAN controllers, supports Wake-on-LAN and PXE
Storage	1 × 7-pin SATA 3.0 connector, transfer rate up to 6 Gbps (shared with mSATA, selectable)
	1 × M.2 Key-M 2280/2242 slot, supports PCIe/SATA SSDs
Expansion Slot	1 × Mini-PCIe slot, supports 4G module and Wi-Fi by default; can be configured via hardware to support mSATA
Rear I/O	6 × Intel® I225V or I226 2.5GbE LAN ports
	1 × 12V DC power input
Front I/O	2 × USB 3.0 ports
	2 × USB 2.0 ports
	1 × Console port (optional JCOM1 2×5-pin header, 2.00 mm pitch; RS485 signal supported via hardware configuration)
	1 × SIM card slot
	1 × DP + HDMI dual-display interface, both supporting 4K @ 60 Hz
	1 × HDD activity LED
	1 × Clear CMOS button
	1 × Power-on auto-start jumper switch
	1 × Power button with LED indicator
Internal I/O	2 × USB 2.0 2×5-pin headers, supporting up to 3 additional USB 2.0 ports. (One USB signal pair on the F_USB2 header is shared with the 4G module. Up to 4 USB 2.0 ports can be supported when the 4G module is not used.)
	2 × COM headers. JCOM1 is not populated by default; its pins can be configured via hardware to support RS485 signals. JCOM2 supports RS232 by default and can be configured via hardware to support RS485/RS422.
	1 × HDD power connector
	1 × 2×5-pin front-panel header for power button and LED indicators
Fan Connector	Fanless CPU cooling design with 1 × 4-pin CPU fan header reserved
GPIO	Supports 4-channel GPIO input/output
TPM	Reserved footprint for onboard TPM 2.0
BIOS	128 Mb Flash ROM

Watchdog	Hardware watchdog timer, 256 levels, 0–255 seconds
Operating System	Windows 10 / Windows 11 / Linux
Power Supply	DC 12V input
Operating Temperature	-10°C to 60°C
Storage Temperature	-20°C to 70°C
Operating Humidity	5%–95% relative humidity, non-condensing
Dimensions	120 mm × 120 mm



Note:

The image above shows the front view of the NUC16R-D5 VER1.1. Images of other models may differ.

The image can be enlarged for viewing. Pin 1 of each pin header is marked with a red triangle.

4. Board Installation

Safety Precautions：

Before installing the motherboard, please read and follow the safety precautions below:

- Do not remove or damage the serial number label, distributor warranty label, or any other warranty-related labels on the motherboard before installation. Otherwise, it may affect the warranty validation.
- Before installing or removing the motherboard or any other hardware devices, make sure the power is turned off and the power cord is unplugged from the power outlet.
- When installing hardware devices into the motherboard connectors or slots, make sure the connectors are firmly and properly seated.
- When handling the motherboard, avoid touching the metal contacts or circuit areas to prevent short circuits.
- When handling the motherboard, CPU, or memory module, it is recommended to wear an anti-static wrist strap. If an anti-static wrist strap is not available, make sure your hands are dry and touch a grounded metal object first to discharge static electricity.
- Before installation, place the motherboard on an anti-static mat or inside an anti-static bag.
- Before unplugging the power connector from the motherboard, make sure the power supply is turned off.
- Before turning on the power, make sure the power supply voltage is set according to the local voltage standard.
- Before turning on the power, make sure all hardware cables and power cables are correctly connected.
- Do not allow screws to contact the circuits or components on the motherboard, as this may cause damage or malfunction.
- Make sure no screws or metal objects are left on the motherboard or inside the computer chassis.
- Do not place the computer system on an unstable surface.
- Do not place the computer system in a high-temperature environment.
- Turning on the power during installation may cause damage to the motherboard, other devices, or personal injury.
- If you are not familiar with the installation process, or if you encounter any technical problems while using this product, please consult qualified technical personnel.

Memory Installation

The motherboard provides **1 × 262-pin DDR5 SO-DIMM memory slot**.

Before installing the memory module, please note the following:

1) Make sure the memory module you purchased is compatible with the specifications supported by this motherboard.
2) Before installing or removing the memory module, make sure the computer power is

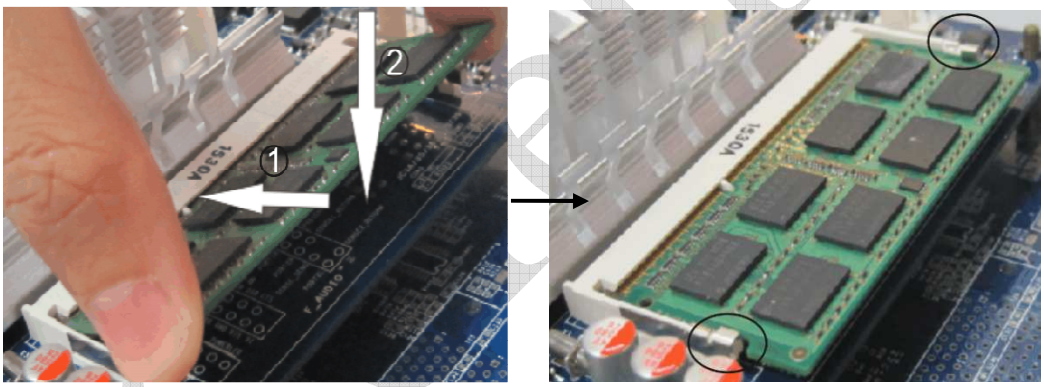
turned off to prevent damage.

3) The memory module is designed with a foolproof notch. If the insertion direction is incorrect, the module cannot be inserted. In this case, please change the insertion direction immediately.

Memory Installation Steps:

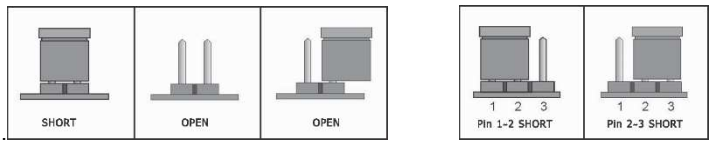
1) Before installing or removing the memory module, turn off the power and unplug the AC power cord.
2) Carefully hold the memory module by both edges. Do not touch the metal contacts.
3) Align the gold fingers of the memory module with the memory slot. Make sure the notch on the memory module matches the key in the slot.
4) Insert the memory module into the slot at an angle of approximately 30 degrees, then gently press it down until you hear a “click” sound. This indicates that the memory module has been properly installed and is ready for use.
   Note: Do not apply excessive force when pressing down the memory module to avoid damage.
5) To remove the memory module, push the retaining clips on both sides of the DIMM slot outward at the same time, then remove the memory module carefully.

Note: The installation diagram is for reference only.



5. Jumper Settings

2-pin header: Install the jumper cap over both pins to close (short) the circuit.
3-pin header: Install the jumper cap over pins 1–2 or pins 2–3 to close (short) the circuit.



How to Identify Pin 1 of a Jumper Header

1) Carefully inspect the motherboard. The pin marked with “1” or indicated by a thick white line is Pin 1.
2) Check the solder pads on the back of the motherboard. In most cases, the square solder pad indicates Pin 1.

Clear CMOS Jumper:

The motherboard provides one 1×3-pin Clear CMOS header, **JBAT1**, for clearing or retaining the CMOS settings (pin pitch: 2.0 mm). The CMOS is powered by the onboard coin-cell battery.

Clearing the CMOS will permanently erase the previous system configuration and restore the system settings to the original factory defaults.

Procedure:

1) Shut down the computer and disconnect the power supply.
2) Short pins 2–3 of JBAT1 for approximately 5 seconds.
3) Power on the computer.
4) During startup, press the key indicated on the screen to enter the BIOS Setup Utility, then load the Optimized Defaults.
5) Save the settings and exit.

The pin definitions are as follows:

JBAT1 Definition：

Function	JBAT1 Setting
Normal Operation	Pins 1–2
Clear CMOS and Restore All BIOS Settings to Factory Defaults	Pins 2–3

Power-on Auto-start Jumper:

The motherboard provides one **1×3-pin AT-ATX1 jumper** (pin pitch: 2.00 mm), which can be used to enable or disable the **power-on auto-start function**.

AT-ATX1 Definition：

Function	AT-ATX1 Setting
Disable Power-on Auto-start	Pins 1–2 (Default)
Enable Power-on Auto-start	Pins 2–3

6. Pin Definitions

1) The motherboard supports a total of **2 serial ports**, including **2 standard DB9 RS232 serial ports**. **COM1 is configured as a Console port by default** and can be changed by replacing the corresponding components. It can optionally be configured as **1 × RS485** port. **JCOM2** can optionally be configured as **RS485/RS422**.

   For optional configurations, please consult us before placing an order.

   The motherboard also provides 2 × 2×5-pin internal serial port headers, JCOM1/JCOM2 (pin pitch: 2.0 mm, optional). JCOM1 and COM1 share the same signals.

   JCOM1/JCOM2 Standard Pin Definition：

PIN	Signal	PIN	Signal
1	DCD（A）	2	RXD（B）
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	NC

   Note:

   Our standard motherboard configuration supports only 2 × RS232 serial ports by default. If RS485 support is required, please contact our sales team in advance. Hardware modifications are required, and the configuration must be arranged before production.

2) The motherboard provides 2 × 2×5-pin USB 2.0 headers (pin pitch: 2.0 mm). The pin definitions of F_USB1/F_USB2 are as follows:

PIN	Signal	PIN	Signal
1	+5V	2	+5V
3	Data0-	4	Data1-
5	Data0+	6	Data1+
7	GND	8	GND
9		10	GND

3) The motherboard provides one internal **2×5-pin FPANEL1 header** (pin pitch: 2.0 mm).The chassis power switch, reset switch, HDD activity LED, and power LED can be connected to this header. The FPANEL1 pin definitions are as follows:

PIN	Signal	PIN	Signal
1	HDDLED+	2	PWRLED+
3	HDDLED-	4	PWRLED-
5	GND	6	PWRBTN#
7	RESETBTN#	8	GND
9	NC	10	

4) The motherboard provides one internal **1×4-pin fan header** (optional). The CPUFAN1 pin definitions are as follows:

PIN	Signal	PIN	Signal
1	GND	2	+12V
3	DET	4	PWM

Note: DET: Fan speed pulse output; PWM: Fan speed PWM control.

5) The motherboard provides one **1×4-pin red SATA HDD power connector** (pin pitch: 2.0 mm). The JSPWR2 pin definitions are as follows:

PIN	Signal
1	+12V
2	GND
3	GND
4	+5V

Please make sure to correctly identify Pin 1 of JSPWR1 before connecting the cable; otherwise, the hard drive may be damaged. Always use the power cable supplied by our company.

