USER MANUAL

CWWK-NUC12D

VER 1.0

Industrial Mini PC Motherboard

Safety Guide

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- To assist you in using the CW motherboard, please read the [User Manual] carefully.

Please be sure to read this Safety Guide thoroughly for relevant product information.

Product Version Identification
You can locate the motherboard's version number on the board itself, indicated as [VER: X.X], where X.X are numerals (e.g., [VER: 1.0] denotes version 1.0). Please pay attention to this product version label when updating the BIOS, drivers, or consulting other technical documentation.

Safety Tips

1. Before using this product, please read the product manual carefully.
2. Uninstalled add-on cards/boards should be stored in an anti-static protective bag.
3. Before removing a board from its anti-static bag, first touch a grounded metal object (e.g., for about 10 seconds) to discharge static electricity from your body and hands.
4. When handling boards, wear anti-static gloves and make a habit of touching only the edges of the board.
5. To avoid electric shock or product damage, always disconnect the AC power before installing, removing, or reconfiguring any board.
6. Before moving a board or the entire system unit, ensure the AC power is disconnected.
7. When adding or removing boards in a complete system unit, you must first disconnect the AC power.
8. Before connecting or disconnecting any device, make sure the AC power is turned off.

9. To prevent unnecessary wear and tear on the product from frequent power cycling, wait at least 30 seconds after powering off before turning the system on again.

订购信息：

No	Model	CPU	Core Count	Frequency	DDR	HDMI	VGA	LAN	USB	COM/485	POWER
1	NUC12D-N22-1215U	I3-1215U	2P/4E	1.2-4.4Ghz	DDR4*2	1	1	2	8	4/2	12-19V
2	NUC12D-N22-1235U	I5-1235U	2P/8E	1.3-4.4Ghz	DDR4*2	1	1	2	8	4/2	12-19V
3	NUC12D-N22-1265U	I7-1265U	2P/8E	1.8-4.8Ghz	DDR4*2	1	1	2	8	4/2	12-19V
4	NUC12D-N22-1240P	I5-1240P	4P/8E	1.7-4.4Ghz	DDR4*2	1	1	2	8	4/2	12-19V
5	NUC12D-N22-12450H	I5-12450H	4P/4E	2.0-4.4Ghz	DDR4*2	1	1	2	8	4/2	12-19V
6	NUC12D-N22-1340P	I5-1340P	4P/8E	1.9-4.6Ghz	DDR4*2	1	1	2	8	4/2	12-19V
7	NUC12D-N22-1335U	I5-1335U	2P/8E	1.3-4.6Ghz	DDR4*2	1	1	2	8	4/2	12-19V

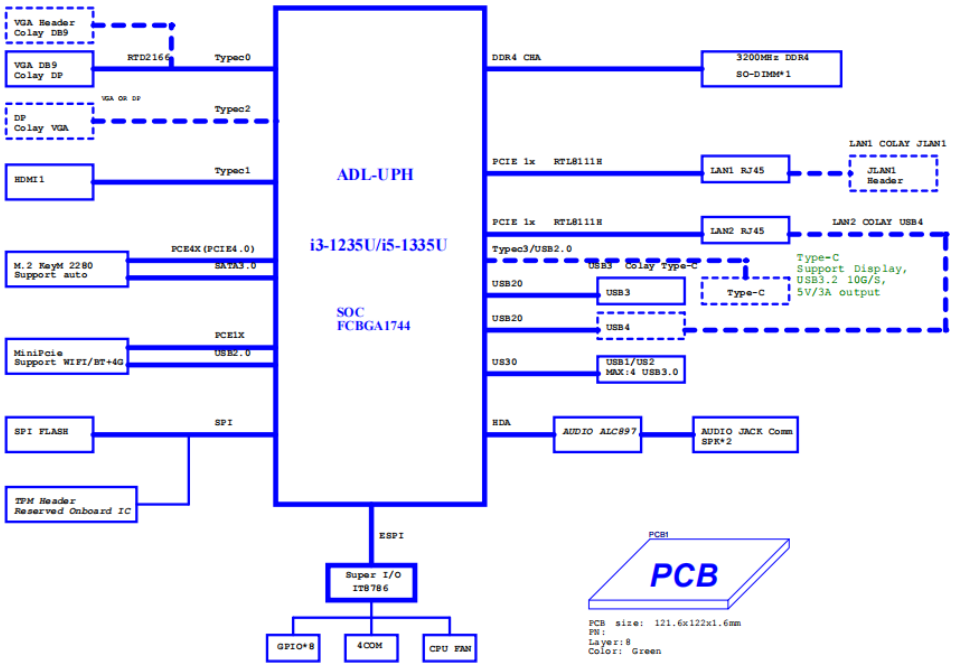
I、Product Introduction

The NUC12D is a CW Industrial Control NANO multi-network series motherboard, supporting the entire Jasper Lake series of CPUs; it can be widely used in areas such as software routers, network security, industrial control, and cloud terminals.

The main features of the NUC12D motherboard are as follows:

1. Supports Intel Alder Lake Raptor Lake -U/P I3/I5/I7 series processors;
2. 1 * SODIMM slot, supporting single-channel 3200MHz DDR4 memory, with a maximum capacity of 32GB;
3. Display support for VGA or DP, HDMI, and Type-C (optional);
4. Supports 2 Realtek Gigabit network ports (single network optional);
5. Supports 1 M.2 Key-M hard drive interface (SATA/PCIE X4 adaptive);
6. Supports 1 MPCIE interface, supporting WIFI/4G;
7. Supports 8 USB ports;
8. Supports 4 RS232 serial ports, default support for 2 RS485, optional support for 1 RS422;
9. Supports AT and ATX mode switching, 12V or -19V DC power supply.

II、Motherboard Block Diagram

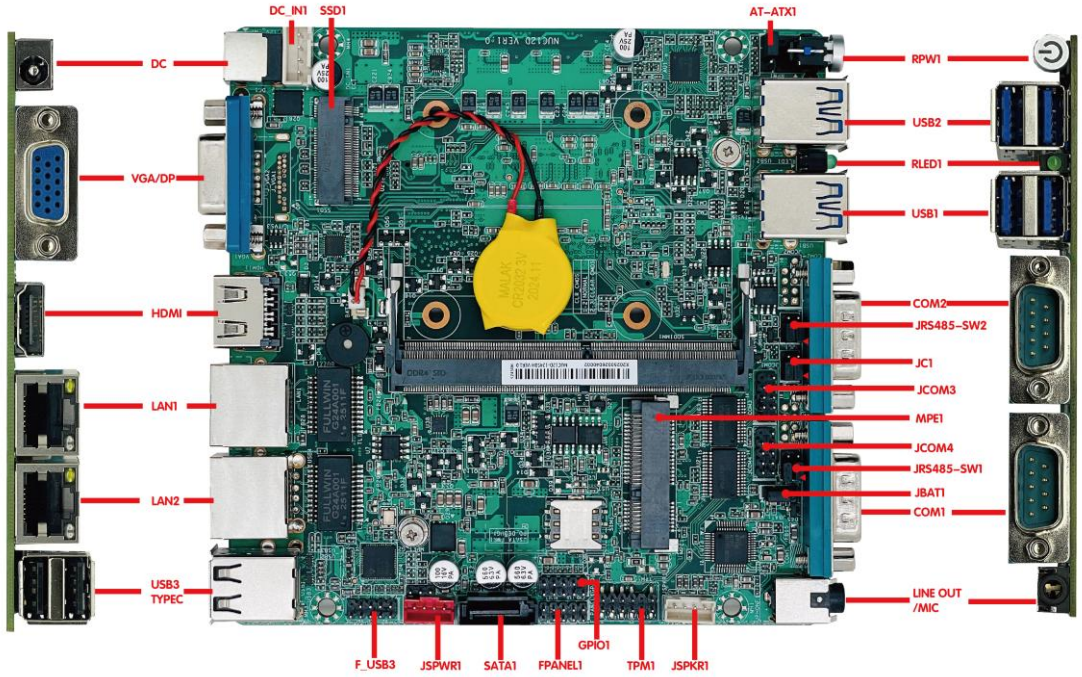


III、Motherboard Detailed Specifications

Item	Description
Processor	Supports Alder Lake-U/P/H 12th Gen / Raptor Lake-U/P/H 13th Gen i3/i5/i7 processors.
RAM	1 x SODIMM slot, supporting single-channel 3200MHz DDR4 memory, with a maximum capacity of 32GB.
Display	Integrated Intel® UHD Graphics core.
	1 x VGA or DP interface (VGA is via a reserved custom header for extension cabling; DP supports 4K@60Hz), 1 x HDMI 2.0 interface (supports 4K@60Hz).
	1 x Type-C display interface, supporting 4K@60Hz.
	Supports synchronous/asynchronous display via VGA or DP and HDMI.

Network	2 x Realtek RTL8111H Gigabit Ethernet controllers (one optional), supporting Wake-on-LAN (WoL) and PXE boot.
Storage	1 x 7-pin SATA 3.0 interface, with a transfer rate of up to 6Gbps.
	1 x M.2 Key-M PCIe x4 2280 slot (compatible with both M.2 PCIe and SATA SSDs).
Audio	Onboard ALC897 7.1-channel high-definition audio controller, supporting MIC/Line-out and an amplifier (2-ohm, 5W per channel, dual-channel).
Expansion Slots	1 x Mini-PCIe slot (supports WiFi and 4G modules).
Front I/O Ports	1 x HDMI display interface, supporting 4K@60Hz.
	1 x VGA display interface (an alternative to the 4K 60Hz DP interface; VGA is the default).
	2 x USB 2.0 ports (optionally supports a Type-C interface with 4K display and USB 3.0 data speeds).
	2 x RJ-45 Gigabit Ethernet interfaces (LAN2 and a USB 2.0 interface are mutually exclusive alternatives).
	1 x 12V-19V DC Power Input Jack. Input voltage limits depend on the CPU model's power consumption.
Rear I/O Ports	1 x 3.5mm audio jack, supporting both Line-OUT and MIC in.
	4 x RS232 serial ports (DB9 connectors).
	4 x USB 3.0 ports.
	1* Illuminated switch button
	1 x Hard Disk Drive (HDD) Activity LED indicator.
	1 x Clear CMOS button.
Internal I/O Headers	4 x COM pin headers.
	1 x amplifier interface (1 x 4-pin header).
	1 x USB 2.0 header, which can be expanded to provide 2 x USB 2.0 ports, sharing signals with the optional LAN2 port.
	1 x GPIO header (2 x 5-pin).
	1 x hard drive power connector (1 x 4-pin header).
	1 x 4-pin ATX power connector.
	1 x front panel switch and indicator interface (2 x 5-pin header).
Security Encryption	1* TPM2.0 pin header interface (2*6Pin), with provision for on-board TPM.
Operating Temperature	-10℃～60℃
Storage Temperature	-20℃～70℃
Operating Humidity	5%-95% relative humidity, non-condensing

Dimensions	120mm x 120mm



Please note: The above image is a front view of the NUC12D VER1.0. Images for other models may differ.

The image can be zoomed in for detailed viewing. The first pin (Pin 1) of all headers is marked with a red triangle.

IV. Motherboard Installation

Safety Notice:

* Do not arbitrarily remove the serial number label or distributor warranty stickers on the motherboard before installation, as this may affect the determination of the product warranty period.
* Before installing or removing the motherboard or any other hardware components, be sure to turn off the power and unplug the power cord from the electrical outlet.
* When installing other hardware devices into the sockets on the motherboard, ensure that the connectors and sockets are firmly and completely engaged.
* Avoid touching the metal traces or components on the motherboard while handling it to prevent short circuits.
* When handling the motherboard, Central Processing Unit (CPU), or memory modules, it is advisable to wear an anti-static wrist strap. If one is not available, ensure your hands are dry and touch a grounded metal object to discharge any static electricity.

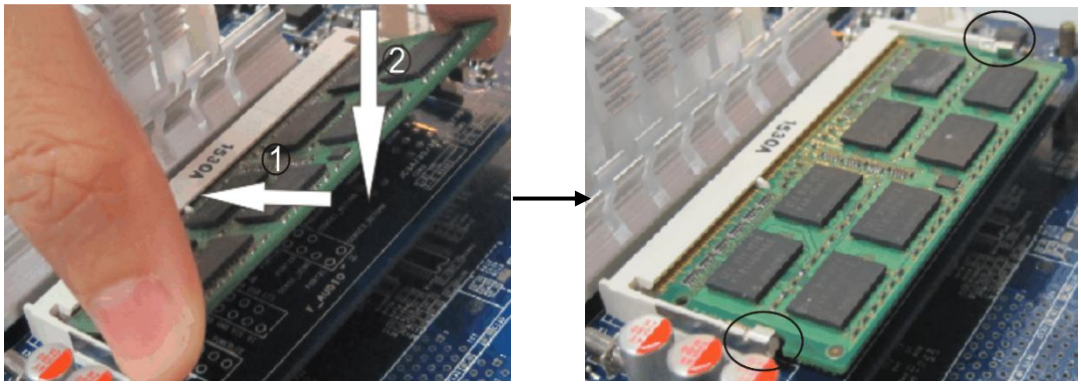
* When the motherboard is not being installed, store it on an anti-static mat or inside an anti-static bag.
* Before disconnecting the power connector from the motherboard's power socket, confirm that the power supply unit is switched off.
* Before turning on the power, verify that the voltage setting on the power supply unit matches the standard voltage of your region.
* Before turning on the power, ensure that all cables and power connectors for hardware devices are correctly and securely connected.
* Prevent screws from coming into contact with the motherboard's circuits or components to avoid damage or malfunction.
* Ensure that no screws or other metal objects are left on the motherboard or inside the computer chassis.
* Do not place the computer chassis on an unstable surface.
* Do not place the computer chassis in an environment with excessively high temperatures.
* Turning on the power during installation may cause damage to the motherboard, other devices, or personal injury.
* If you are unfamiliar with the installation procedures or encounter any technical issues while using this product, please consult a qualified technician.

Memory Installation.

This motherboard provides 1 x 260-pin DDR4 SO-DIMM memory slot.
Before starting memory installation, please note the following information:
1. Please first confirm that the memory you purchased is compatible with the specifications supported by this motherboard.
2. Before installing or removing the memory, ensure the computer's power is turned off to prevent damage.
3. The memory module has a foolproof design with a keying notch. If inserted in the wrong orientation, it cannot be seated. In that case, immediately change the insertion direction.

Installing Memory:
1. Before installing or removing memory, turn off the power and unplug the AC power cord.
2. Carefully hold the memory module by its edges, avoiding contact with the metal contacts (gold fingers).
3. Align the notch on the memory module's gold fingers with the key in the memory slot.
4. Insert the memory module into the slot at a 30-degree angle. Then, gently press the module downward until you hear a "click" sound, indicating successful installation. (Note: Avoid using excessive force when pressing down to prevent damage to the memory.)
5. To remove the memory module, simultaneously push the retention clips at both ends of the DIMM slot outward, and then lift the memory module out.

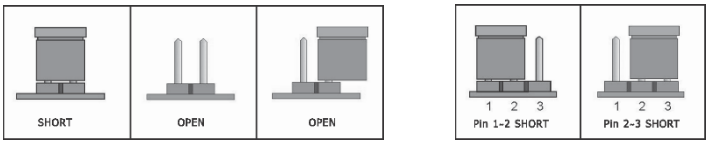
Installation diagrams are for reference only:



V. Jumper Settings

Jumper Explanation

2-pin header: Placing the jumper cap over both pins closes (shorts) the circuit.
3-pin header: The jumper cap can be placed over pins 1-2 or pins 2-3 to close (short) the circuit accordingly.



How to identify the position of Pin 1 on a jumper?
1. Carefully examine the motherboard. Any pin marked with a "1" or a thick white line indicates the Pin 1 position.
2. Look at the solder pads on the back of the board. Typically, a square solder pad denotes the first pin (Pin 1).

Clear CMOS Jumper: The motherboard provides a 1x3-pin Clear CMOS header, JBAT1, for clearing or preserving CMOS settings (pin pitch: 2.0mm). The CMOS is powered by an onboard coin cell battery. Clearing the CMOS will permanently erase previous system configurations and restore the original (factory default) settings. The procedure is as follows:

(1) Turn off the computer and disconnect the power.

(2) Short pins 2-3 on the JBAT1 header for approximately 5 seconds.

(3) Turn on the computer.

(4) During startup, press the key prompted on the screen to enter BIOS Setup and reload the Optimized Defaults.

(5) Save and exit the setup.

The pin definition is as follows:

JBAT1 Definition:

Corresponding Function	JBAT1 Settings
Normal operating state	1-2Pin
Clear CMOS contents All BIOS settings will be restored to factory defaults.	2-3Pin

Power-on function jumper: The motherboard provides one 1*3PIN AT-ATX1 jumper (pin pitch: 2.54 mm), which can be used to control whether the system powers on or not via a jumper cap.

AT-ATX1 Definition:

Corresponding Function	AT-ATX1 Settings
Disable the automatic startup function after power-on.	1-2Pin（Default）
Enable the automatic startup function after power-on.	2-3Pin

VI、Pin definitions

1、It supports up to 4 serial ports (default support for 2 standard DB9 serial ports), with 4 built-in 2*5Pin standard COM header ports (pin pitch: 2.0mm). COM1 and COM2 support RS232 or RS485 (configurable via jumpers), and JCOM1, JCOM2, JCOM3, and JCOM4 have standard pin definitions:

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

JCOM1 and COM1 share the same signal, allowing for selection between the two; similarly, JCOM2 and COM2 share the same signal, also allowing for selection. JCOM1 and JCOM2 are not installed by default.

2、COM1 and COM2 support RS232 by default, and can also support RS485 via jumpers. The jumper settings are as follows:

Port	Corresponding Function	JRS485_SW1 Setting	JC1 Setting	Definition
COM1	RS232	1-3Pin ,2-4Pin (Default)	1-3Pin (Default)	COM1 Pin 2 is (RXD). COM1 Pin 3 is (TXD).
	RS485	3-5Pin ,4-6Pin	3-5Pin	COM1 Pin 1 is (A). COM1 Pin 2 is (B).

Port	Corresponding Function	JRS485_SW2 Setting	JC1 Setting	Definition
COM2	RS232	1-3Pin ,2-4Pin (Default)	2-4Pin (Default)	COM2 PIN 2 is（RXD） COM2 PIN 3 is（TXD）
	RS485	3-5Pin ,4-6Pin	4-6Pin	COM2 Pin 1 is（A） COM2 Pin 2 is（B）
Port	Corresponding Function	JRS485_SW2 Setting	JC1 Setting	Definition
COM2	RS422	3-5Pin ,4-6Pin	4-6Pin	COM2 Pin 1 is TX+ COM2 Pin 2 is TX- COM2 Pin 3 is RX+ COM2 Pin 4 is RX-

3、The motherboard provides one 1x4-pin amplifier interface in the form of a header (pin pitch: 2.0mm), JSPKR1. The pin definition is as follows:

PIN	Signal name
1	SPKL-
2	SPKL+
3	SPKR-
4	SPKR+

4、An internal 2x5-pin FPANEL1 header is provided (pin pitch: 2.0mm). The chassis power switch, reset switch, HDD activity LED, and power LED can be connected to this header. The FPANEL1 pin definition is as follows:

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

5、It includes one built-in 1*4Pin fan connector (optional), and the pin definition for CPUFAN1 is as follows:

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

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

6、The motherboard provides one built-in 2x6-pin TPM2.0 header. The TPM1 pin definition is as follows:

PIN	Signal name	PIN	Signal name
1	SPI POWER	2	SPI CS#
3	SPI MISO	4	SPI MOSI
5	NC	6	SPI CLK
7	GND	8	SPI RESET
9	NC		
11	NC	12	SPI IRQ

7、The motherboard provides one 2x5-pin GPIO header (pitch: 2.0mm). The GPIO1 pin definition is as follows:

PIN	Signal name	PIN	Signal name
1	GND	2	+5V
3	GPO1	4	GPI1
5	GPO2	6	GPI2
7	GPO3	8	GPI3
9	GPO4	10	GPI4

8、This board provides one 1x4-pin red SATA hard drive power interface (pitch: 2.0mm). The JSATA_PWR1 pin definition is as follows:

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

It is essential to correctly identify the Pin 1 position of JSPWR1 to avoid damaging the hard drive. When in use, the power cable provided as standard by our company must be used.

9、This board includes one built-in 1x4-pin DC power interface. The DC_IN1 pin definition is as follows:

PIN	Signal name
1	+12V/19V
2	+12V/19V
3	GND
4	GND

10、The motherboard includes one built-in 2x5-pin (pitch: 2.0mm) USB2.0 header. The F_USB3 pin definition is as follows:

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