

CoreIPC

NUC12D

120 x 120 mm Industrial NUC Motherboard Datasheet

Intel® Alder Lake / Raptor Lake U/P/H Platform

Document	Datasheet
Model	NUC12D
Issue	1.1
Product Type	120 x 120 mm Industrial NUC Motherboard
Website	www.CoreIPC.com

This datasheet is prepared based on NUC12D User Manual Issue 1.1.

1. Product Overview

The NUC12D is a compact 120 x 120 mm industrial NUC motherboard supporting 12th Gen Intel® Alder Lake-U/P/H and 13th Gen Intel® Raptor Lake-U/P/H Core™ i3/i5/i7 processors. It combines dual Gigabit Ethernet, SATA and M.2 storage, multiple USB and serial interfaces, optional wireless expansion, TPM support, and 12-19 V DC input for embedded and industrial applications.

2. Key Features

- Supports 12th Gen Intel® Alder Lake-U/P/H and 13th Gen Intel® Raptor Lake-U/P/H Core™ i3/i5/i7 processors.
- 1 x DDR4 SO-DIMM slot supporting single-channel DDR4-3200 memory, up to 32 GB.
- Supports VGA or optional DP, HDMI 2.0, and optional USB Type-C display output; DP/HDMI/Type-C support up to 4K @ 60 Hz where specified.
- Up to two Realtek RTL8111H Gigabit Ethernet ports with Wake-on-LAN and PXE support; single-LAN option available.
- Storage includes 1 x SATA 3.0 plus 1 x M.2 Key M 2280 PCIe x4 slot with automatic PCIe/SATA drive adaptation.
- 1 x Mini PCIe slot supporting Wi-Fi and 4G modules.
- Supports up to 8 USB interfaces, including front/rear USB 3.0 and USB 2.0 depending on LAN and Type-C configuration.
- Two DB9 RS232 ports by default; COM1/COM2 support RS485 by jumper setting. Optional four-RS232 configuration and optional RS422 on COM2 require customization.
- Onboard Realtek ALC897 7.1-channel HD audio with MIC, Line-out and 2 ohm / 5 W stereo amplifier support.
- Compact 120 x 120 mm form factor; 12-19 V DC input; TPM 2.0 header; operating temperature -10°C to 60°C.

3. Technical Specifications

Category	Specification
CPU	12th Gen Intel® Alder Lake-U/P/H and 13th Gen Intel® Raptor Lake-U/P/H Core™ i3/i5/i7 processors.
Memory	1 x 260-pin DDR4 SO-DIMM slot; single-channel DDR4-3200; up to 32 GB.
Graphics / Display	Integrated Intel® UHD Graphics. 1 x VGA or optional DP; 1 x HDMI 2.0; optional USB Type-C display. DP, HDMI and optional Type-C are specified up to 4K @ 60 Hz.
Ethernet	Up to 2 x Realtek RTL8111H Gigabit Ethernet controllers; single-LAN option available; Wake-on-LAN and PXE support.
Storage	1 x SATA 3.0 connector; 1 x M.2 Key M 2280 PCIe x4 slot with automatic PCIe/SATA drive adaptation.
Audio	Onboard Realtek ALC897 7.1-channel HD audio; MIC, Line-out and 2 ohm / 5 W stereo amplifier support.
Expansion	1 x Mini PCIe slot supporting Wi-Fi and 4G modules.
USB	Up to 8 USB ports. Front I/O includes 2 x USB 2.0; rear I/O includes 4 x USB 3.0; 1 x internal USB 2.0 header supports two ports. Optional Type-C can provide USB 3.0 data.
Serial Ports	2 x DB9 RS232 by default. COM1/COM2 support RS485 by jumper settings. Up to 4 serial ports can be configured; optional RS422 on COM2 requires customization.
GPIO	1 x 2 x 5-pin GPIO header supporting 4 inputs and 4 outputs.
TPM	1 x 2 x 6-pin TPM 2.0 header, with provision for onboard TPM.
Power	12-19 V DC input; supported input voltage depends on CPU power consumption. 1 x 4-pin ATX power connector.
Fan	1 x optional 4-pin CPU fan header with GND, +12 V, DET and PWM.
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 x 120 mm.

4. I/O Interface Summary

4.1 Rear Panel I/O

Interface	Description
Display	1 x HDMI 2.0; 1 x VGA by default or optional DP; optional USB Type-C display.
USB	2 x USB 2.0 on front I/O; optional Type-C supports USB 3.0 data rates.
LAN	Up to 2 x RJ-45 Gigabit Ethernet ports; LAN2 and the front USB 2.0 ports are mutually exclusive.
Power	1 x 12-19 V DC input; actual supported voltage depends on CPU power consumption.

4.2 Internal I/O and Headers

Interface / Header	Description
Serial	2 x additional COM headers, not populated by default; optional support for four RS232 ports.
Amplifier	1 x 1 x 4-pin amplifier header supporting 2 ohm / 5 W stereo output.
USB 2.0	1 x 2 x 5-pin USB 2.0 header supporting two USB 2.0 ports; signals are shared with LAN2.
GPIO	1 x 2 x 5-pin GPIO header supporting 4 inputs and 4 outputs.
SATA Power	1 x 1 x 4-pin SATA drive power connector.
ATX Power	1 x 4-pin ATX power connector.
Front Panel	1 x 2 x 5-pin front-panel switch and LED header.
TPM	1 x 2 x 6-pin TPM 2.0 header, with provision for onboard TPM.
Fan	1 x optional 4-pin CPU fan header.

5. Display Support

The NUC12D provides HDMI 2.0 and VGA as standard display interfaces, with DP available instead of VGA and USB Type-C display available as an option. The source manual specifies HDMI, optional DP, and optional Type-C at up to 4K @ 60 Hz.

Item	Description
Integrated Graphics	Intel® UHD Graphics.
VGA / DP	VGA is standard; DP is optional in place of VGA. DP supports up to 4K @ 60 Hz.
HDMI	1 x HDMI 2.0 output, up to 4K @ 60 Hz.
USB Type-C	Optional display output supporting up to 4K @ 60 Hz and USB 3.0 data rates.
Multi-display	The source manual specifies synchronous/asynchronous display through VGA or DP and HDMI.

6. Serial Port Configuration

Port	Default / Optional Function
COM1	RS232 by default; supports RS485 through jumper configuration.
COM2	RS232 by default; supports RS485 through jumper configuration; RS422 is optional through customization.
JCOM1 / JCOM2	Share signals with COM1 / COM2 respectively and are mutually exclusive; not populated by default.
Additional COM	Up to four serial ports can be supported by hardware modification; contact sales before ordering.
Default Serial Mix	Standard configuration is 2 x DB9 RS232; the source manual also lists 2 x RS485 as the default configurable serial function.

7. Power, Cooling and Reliability Functions

Item	Description
Main Power	12-19 V DC input; supported input voltage depends on CPU power consumption.
AT / ATX Mode	Supports AT/ATX power mode through the AT-ATX1 jumper; auto power-on can be enabled or disabled.
CPU Fan	1 x optional 4-pin CPU fan header with GND, +12 V, DET and PWM.
TPM	1 x TPM 2.0 header, with provision for onboard TPM.
CMOS Clear	JBAT1 1 x 3-pin Clear CMOS jumper; a Clear CMOS button is also listed in the rear I/O section.

8. Mechanical and Environmental Information

Item	Description
Form Factor	Compact industrial NUC motherboard.
Dimensions	120 mm x 120 mm.
Operating Temperature	-10°C to 60°C.
Storage Temperature	-20°C to 70°C.
Operating Humidity	5%-95% relative humidity, non-condensing.
Installation Notes	Use ESD protection and power off the system before installation, removal or hardware reconfiguration.

9. Ordering Information

Model	Description
NUC12D-N22-1215U	Core i3-1215U; 2P/4E; 1.2-4.4 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
NUC12D-N22-1235U	Core i5-1235U; 2P/8E; 1.3-4.4 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
NUC12D-N22-1265U	Core i7-1265U; 2P/8E; 1.8-4.8 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
NUC12D-N22-1240P	Core i5-1240P; 4P/8E; 1.7-4.4 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
NUC12D-N22-12450H	Core i5-12450H; 4P/4E; 2.0-4.4 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
NUC12D-N22-1340P	Core i5-1340P; 4P/8E; 1.9-4.6 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
NUC12D-N22-1335U	Core i5-1335U; 2P/8E; 1.3-4.6 GHz; DDR4; HDMI; VGA; 2 LAN; 8 USB; 2 COM / 2 RS485; 12-19 V.
Options	Single-LAN, DP instead of VGA, optional USB Type-C, wireless modules, four-RS232 and RS422 configurations depend on the selected production configuration.

10. Compliance and Documentation Notes

- Certification and compliance information is not specified in the source manual. Contact CoreIPC for project-specific certification or compliance documentation.
- Memory: 1 x 260-pin DDR4 SO-DIMM slot supporting single-channel DDR4-3200 memory, up to 32 GB. The revised Ordering Information now lists DDR4 consistently with the detailed specification.
- LAN2 shares resources with selected USB 2.0 signals in the source manual. The exact USB/LAN combination and optional USB Type-C implementation depend on the selected production configuration.

11. Contact Information

Company	CoreIPC
Sales Team	CoreIPC Sales Team
Email	sales@coreipc.com
Website	https://www.coreipc.com/

Disclaimer: This datasheet was compiled from NUC12D User Manual Issue 1.1. Product specifications, interface counts and optional functions may vary by production configuration. Please confirm the selected configuration before order placement. All product names, trademarks and registered trademarks are the property of their respective owners.