

NEZHA

Maker Board
NEZHA-N97

User's Manual 2nd Ed

Copyright Notice

This document is copyrighted, 2023. All rights are reserved. The original manufacturer reserves the right to make improvements to the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of the original manufacturer. Information provided in this manual is intended to be accurate and reliable. However, the original manufacturer assumes no responsibility for its use, or for any infringements upon the rights of third parties that may result from its use.

The material in this document is for product information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, AAEMON assumes no liabilities resulting from errors or omissions in this document, or from the use of the information contained herein.

AAEMON reserves the right to make changes in the product design without notice to its users.

Acknowledgement

All other products' name or trademarks are properties of their respective owners.

- Microsoft®, Windows®, Windows® 10 IoT Enterprise, and Windows® IoT Core are registered trademarks of Microsoft Corp.
- Intel® is a registered trademark of Intel Corporation
- Yocto Project® is a trademark of The Linux Foundation.
- Linux® is a registered trademark of Linus Torvalds in the U.S. and other countries.
- Ubuntu and Canonical are registered trademarks of Canonical Ltd.

All other product names or trademarks are properties of their respective owners.

Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● NEZHA (Nezha-N97) with Passive Heatsink	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please the contact our service personnel:
 - i. Damaged power cord or plug
 - ii. Liquid intrusion to the device
 - iii. Exposure to moisture
 - iv. Device is not working as expected or in a manner as described in this manual
 - v. The device is dropped or damaged
 - vi. Any obvious signs of damage displayed on the device
18. **DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.**

Warning!



This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte. Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	X	X	○	○	○	○
外部信号 连接器及线材	X	X	○	○	○	○
<p>○: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p>						

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products
 AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	X	X	○	○	○	○
Wires & Connectors for External Connections	X	X	○	○	○	○
<p>O: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.</p> <p>X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.</p> <p>Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p>						

Table of Contents

Chapter 1 - Product Specifications	1
1.1 Specifications.....	2
Chapter 2 – Hardware Information	4
2.1 Dimensions.....	5
2.2 Jumpers and Connectors	7
2.3 List of Jumpers and Connectors.....	9
2.3.1 Power Button (SW1)	10
2.3.2 RTC (CN1)	10
2.3.3 LAN Port (CN2).....	11
2.3.4 HAT 40 (CN3).....	12
2.3.5 CPLD/BIOS Update (CN4)	13
2.3.6 HDMI/USB (Type-A) (CN5)	13
2.3.7 Dual USB Port (Type-A) (CN6).....	14
2.3.8 USB 2.0/UART 1x10P Wafer (CN7)	15
2.3.9 DC Power Jack (CN8)	16
2.3.10 Front Panel (1x4P Wafer).....	16
2.3.11 DC Power Wafer (CN10)	17
2.3.12 Fan Connector (CN11)	17
Chapter 3 – Software Installation	18
3.1 Linux Setup	19
3.2 Windows Drivers Installation	19
Chapter 4 – Mechanical Installation	20
4.1 Board Pillar Installation.....	21
4.1.1 Option 1.....	21
4.1.2 Option 2	23
Appendix A – UP Framework SDK Installation	24

A.1 Introduction25

A.2 Installation for Windows 1025

Appendix B – Cables and Connectors 28

B.1 Cables and Connectors.....29

Chapter 1

Product Specifications



1.1 Specifications

System

Processor	Intel® Processor N97 (formerly Alder Lake-N)
Graphics	Intel® UHD Graphics
Memory	Dual-Channel LPDDR5, 4GB/8GB
Storage	eMMC, 32GB/64GB
I/O	HDMI 1.4b/USB 3.2 Gen 2 STACK Connector x 1 (Type-A) 4-pin Front Panel x 1 2-pin Fan Wafer x 1 (12V) 2-pin RTC Battery Wafer x 1
Camera	-
USB	USB 3.2 Gen 2 (Type-A) x 3 10-pin USB 2.0 x 2/UART x 1
Expansion	40-pin GPIO x 1
Display Interface	HDMI 1.4b x 1
Ethernet	1GbE RJ-45 x 1 (Realtek RTL8111H CG)
Security	Onboard TPM 2.0
RTC	Yes
OS Support	Windows® 10 Enterprise LTSC 2021 Linux: Ubuntu 22.04 LTS/Kernel 5.15 Yocto 4.0

Power Requirement

Power	12V DC-in, 5A
Power Supply Type	AT/ATX (Default: AT)
Power Consumption	30~36W

Mechanical

Dimension	3.34" x 2.20" (85mm x 56mm)
Net Weight	0.33 lb. (0.15Kg)
Gross Weight	0.44 lb. (0.20Kg)

Environment

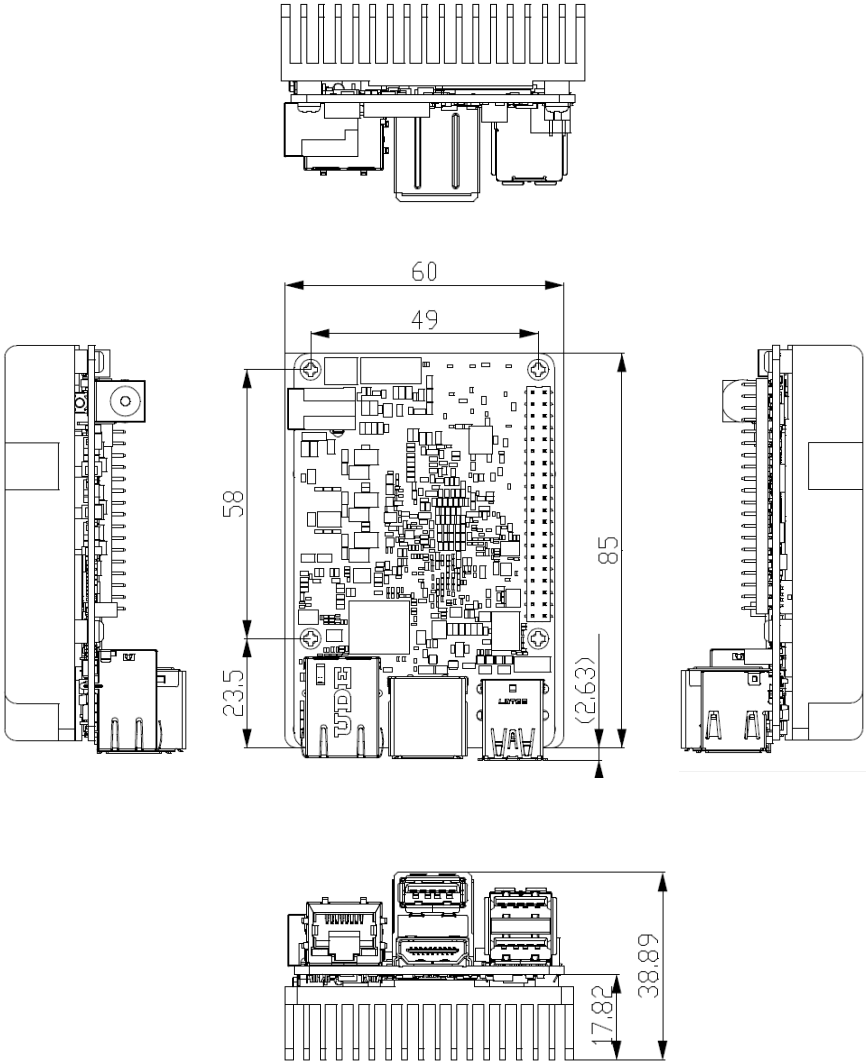
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C) / 0.5 airflow
Operation Humidity	0% ~ 90% relative humidity, non-condensing
MTBF	685,218
Certification	CE/FCC Class A, RoHS Compliant, REACH

Chapter 2

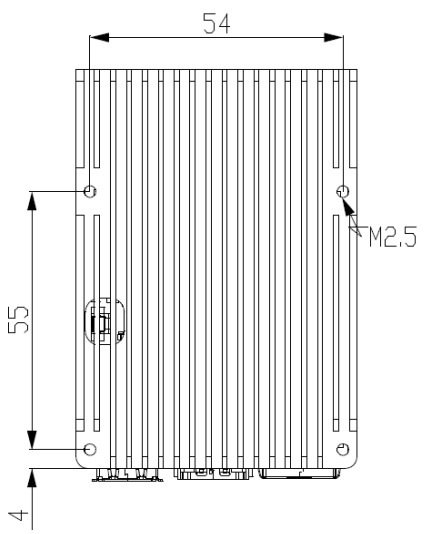
Hardware Information

2.1 Dimensions

Top:

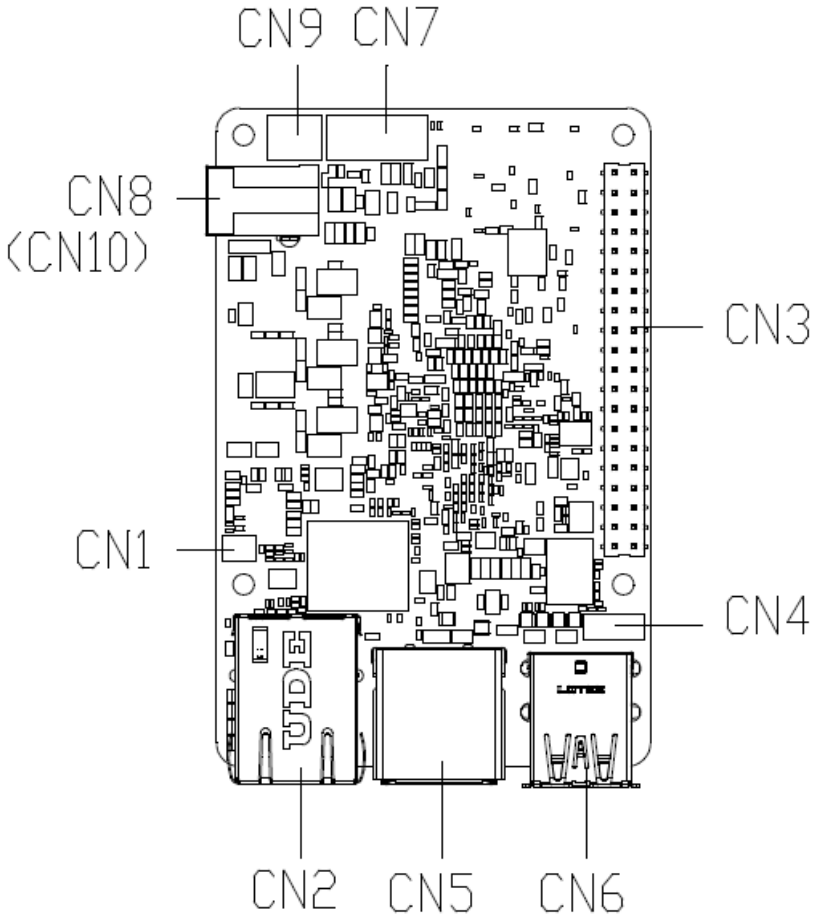


Bottom:

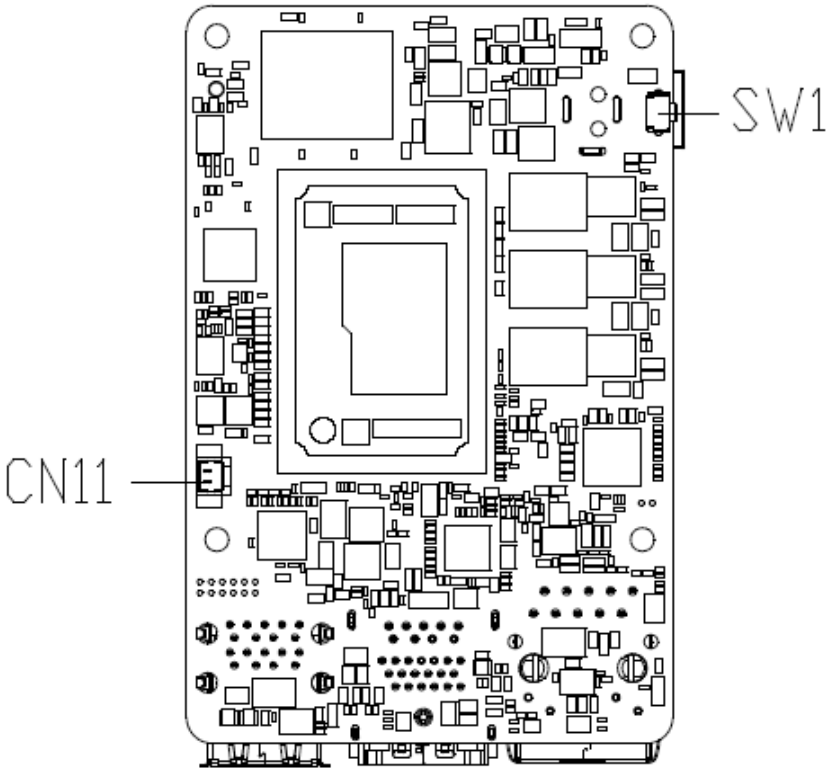


2.2 Jumpers and Connectors

Top:



Bottom:

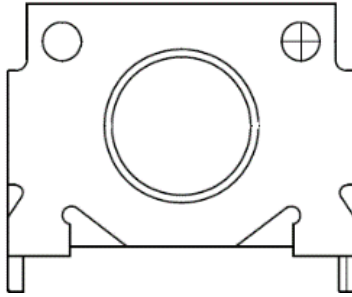


2.3 List of Jumpers and Connectors

Please refer to the table below for all of the board's jumpers and connectors that you can configure for your application

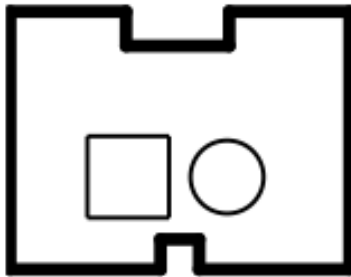
Label	Function
SW1	Power Button
CN1	RTC
CN2	LAN Port
CN3	HAT 40
CN4	CPLD/BIOS Update
CN5	HDMI/USB (Type-A)
CN6	Dual USB Port (Type-A)
CN7	USB 2.0/UART 1x10P Wafer
CN8	DC Power Jack
CN9	Front Panel (1x4P Wafer)
CN10	DC Power Wafer
CN11	Fan Connector

2.3.1 Power Button (SW1)



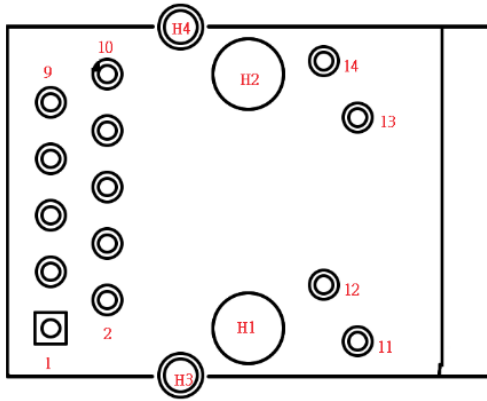
Pin	Signal	Pin	Signal
1	PWR_SW#	2	GND

2.3.2 RTC (CN1)



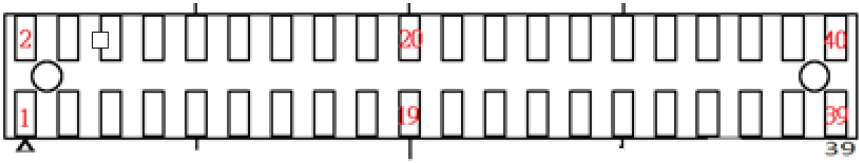
Pin	Signal	Pin	Signal
1	RTC_VCC	2	GND

2.3.3 LAN Port (CN2)



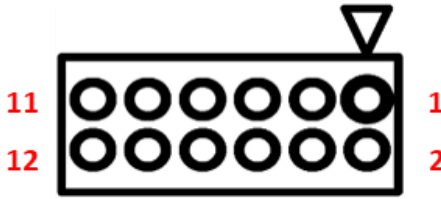
Pin	Signal	Pin	Signal
1	LAN1_MDI0+	2	LAN1_MDI0-
3	LAN1_MDI1+	4	LAN1_MDI1-
5	CT_GND	6	CT_GND
7	LAN1_MDI2+	8	LAN1_MDI2-
9	LAN1_MDI3+	10	LAN1_MDI3-
11	LAN Link LED 1000#	12	LAN Link LED 100#
13	LAN Active LED_N	14	LAN Active LED_P
H1	NC	H2	NC
H3	Chassis GND	H4	Chassis GND

2.3.4 HAT 40 (CN3)



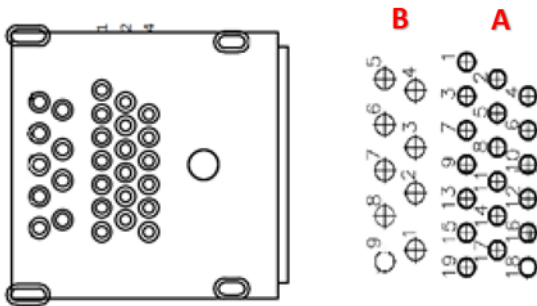
Pin	Signal	Pin	Signal
1	+3.3V	2	+5V
3	I2C1_DAT / GPIO1	4	+5V
5	I2C1_CLK / GPIO2	6	GND
7	ANALOG_DATA / GPIO3	8	UART_TX / GPIO16
9	GND	10	UART_RX / GPIO17
11	RTS / GPIO4	12	I2S_BCLK / GPIO18
13	GPIO5	14	GND
15	GPIO6	16	GPIO19
17	+3.3V	18	GPIO20
19	SPI_MOSI / GPIO7	20	GND
21	SPI_MISO / GPIO8	22	GPIO21
23	SPI_CLK / GPIO9	24	SPI_CS0 / GPIO22
25	GND	26	GPIO23
27	I2C0_DAT / GPIO10	28	I2C0_CLK / GPIO24
29	GPIO11	30	GND
31	GPIO12	32	PWM0 / GPIO25
33	PWM1 / GPIO13	34	GND
35	I2S_SYNC / GPIO14	36	CTS / GPIO26
37	GPIO15	38	I2S_SDI / GPIO27
39	GND	40	I2S_SDO / GPIO28

2.3.5 CPLD/BIOS Update (CN4)



Pin	Signal	Pin	Signal	Pin	Signal
1	JTAG_TCK	2	GND	3	JTAG_TDO
4	1.8V	5	JTAG_TMS	6	SPI_CS
7	SPI_CLK	8	SPI_MISO	9	JTAG_TDI
10	GND	11	SPI_MOSI	12	SPI_HOLD

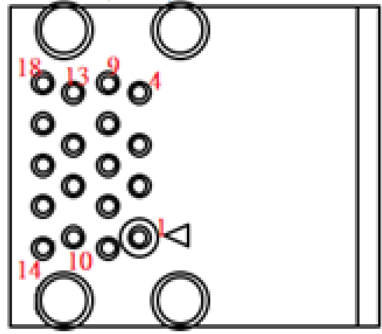
2.3.6 HDMI/USB (Type-A) (CN5)



Pin	Signal	Pin	Signal
A1	HDMI_TMDS_TXP2	A2	GND
A3	HDMI_TMDS_TXN2	A4	HDMI_TMDS_TXP1
A5	GND	A6	HDMI_TMDS_TXN1
A7	HDMI_TMDS_TXP0	A8	GND
A9	HDMI_TMDS_TXN0	A10	HDMI_TMDS_Clock_P

Pin	Signal	Pin	Signal
A11	GND	A12	HDMI_TMDS_Clock_N
A13	NC	A14	NC
A15	HDMI_DDC_Clock	A16	HDMI_DDC_Data
A17	GND	A18	5V@1A for HDMI
A19	HDMI Hot Plug detect pin		
B1	5V@0.9A for USB 3.2	B2	USB2.0_DN3
B3	USB2.0_DP3	B4	GND
B5	USB3.2_RXN3	B6	USB3.2_RXP3
B7	GND	B8	USB3.2_TXN3
B9	USB3.2_TXP3		

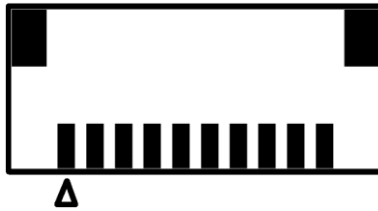
2.3.7 Dual USB Port (Type-A) (CN6)



Pin	Signal	Pin	Signal
1	5V@0.9A for USB 3.2	2	USB2.0_DN1
3	USB2.0_DP1	4	GND
5	USB3.2_RXN1	6	USB3.2_RXP1
7	GND	8	USB3.2_TXN1
9	USB3.2_TXP1		
10	5V@0.9A for USB 3.2		

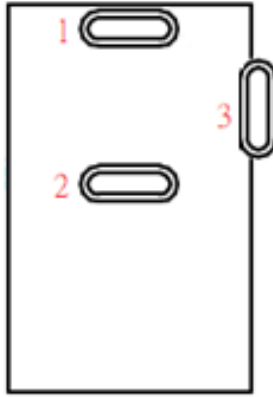
Pin	Signal	Pin	Signal
11	USB2.0_DN2	12	USB2.0_DP2
13	GND	14	USB3.2_RXN2
15	USB3.2_RXP2	16	GND
17	USB3.2_TXN2	18	USB3.2_TXP2
H1	GND	H2	GND
H3	GND	H4	GND

2.3.8 USB 2.0/UART 1x10P Wafer (CN7)



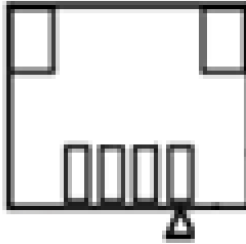
Pin	Signal	Pin	Signal	Pin	Signal
1	5V@0.5A for USB2.0	2	USB2.0_DN5	3	USB2.0_DP5
4	GND	5	5V@0.5A for USB2.0	6	USB2.0_DN4
7	USB2.0_DP4	8	GND	9	UART_RX
10	UART_TX				

2.3.9 DC Power Jack (CN8)



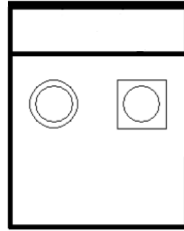
Pin	Signal	Pin	Signal
1	12V	2	GND
3	GND		

2.3.10 Front Panel (1x4P Wafer) (CN9)



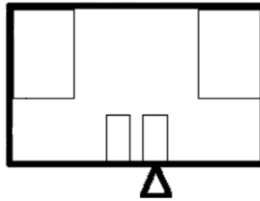
Pin	Signal	Pin	Signal
1	Power Button#	2	GND
3	Reset Button#	4	GND

2.3.11 DC Power Wafer (CN10)



Pin	Signal	Pin	Signal
1	12V	2	GND

2.3.12 Fan Connector (CN11)



Pin	Signal	Pin	Signal
1	12V	2	GND

Chapter 3

Software Installation

3.1 Linux Setup

The NEZHA-N97 supports Linux operating systems (see Chapter 1 for specifications). For instructions on how to install a Linux OS onto your NEZHA-N97, you can find several guides and tutorials in the wiki section of the NEZHA-N97 website at <https://www.bbs.aaeon.ai/forum/up-kai-fa-ban> for both installing supported distributions as well as porting your own Linux build.

3.2 Windows Drivers Installation

Drivers for the NEZHA-N97 can be downloaded from the NEZHA-N97 website by following the link <https://www.bbs.aaeon.ai/forum/up-kai-fa-ban> and navigating to the Downloads section, then clicking on the NEZHA-N97 to find all relevant drivers.

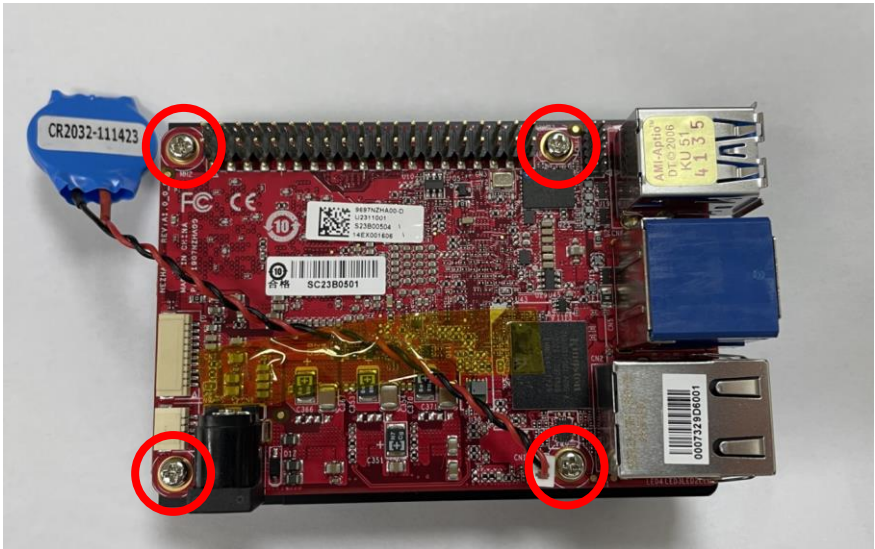
Chapter 4

Mechanical Installation

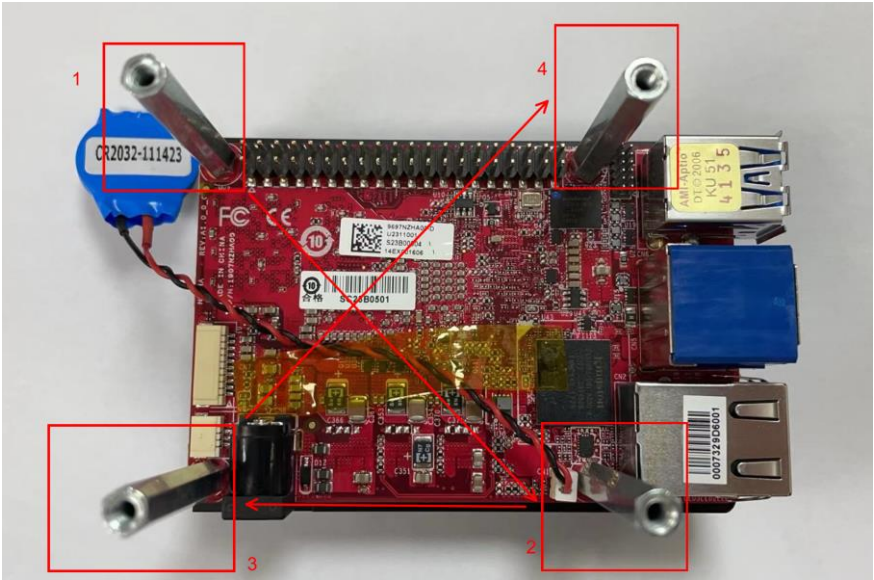
4.1 Board Pillar Installation

4.1.1 Option 1

Step 1: Remove the four (4) screws from the outer edges of the board.

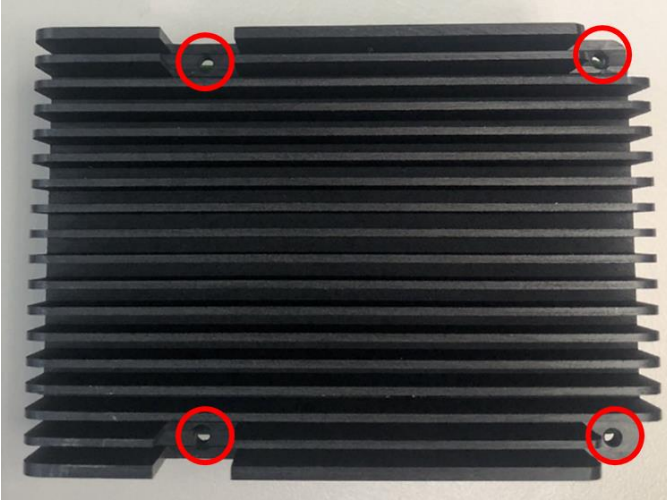


Step 2: Affix and lock the four (4) pillars to the board in the following sequence.



4.1.2 Option 2

Affix and lock the four (4) pillars from heatsink side.



Appendix A

UP Framework SDK Installation

A.1 Introduction

This section provides instructions for the installation of the UP Framework SDK.

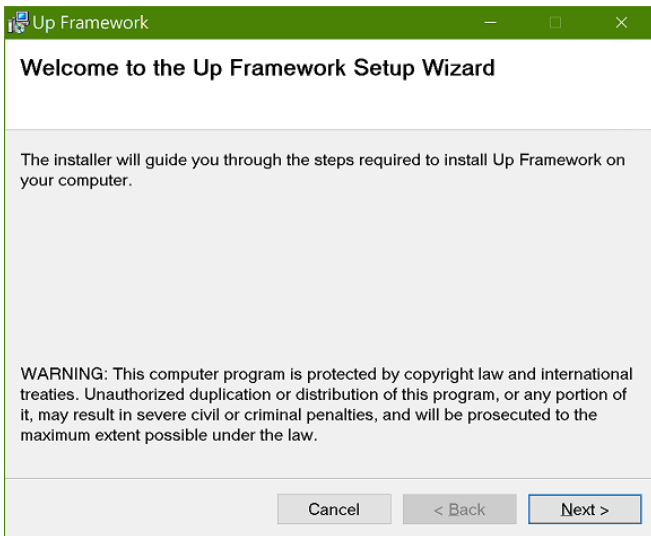
Instructions are provided for Windows 10. You can download the latest version of UP Framework SDK from the UP community:

<https://www.bbs.aaeon.ai/forum/up-kai-fa-ban/nezha-na-zha-sdk-for-windows-10-and-windows-iot>

A.2 Installation for Windows 10

Step 1

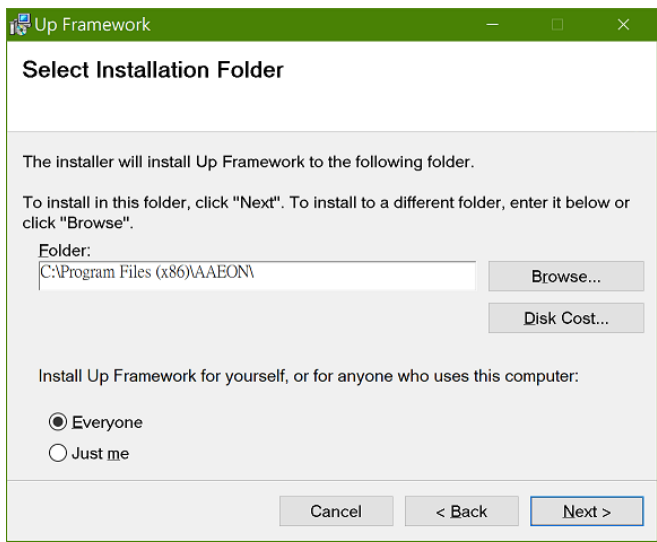
Locate the downloaded file UpFrameworkSetup.msi and run the installer. Press “Next” to begin the setup process.



Step 2

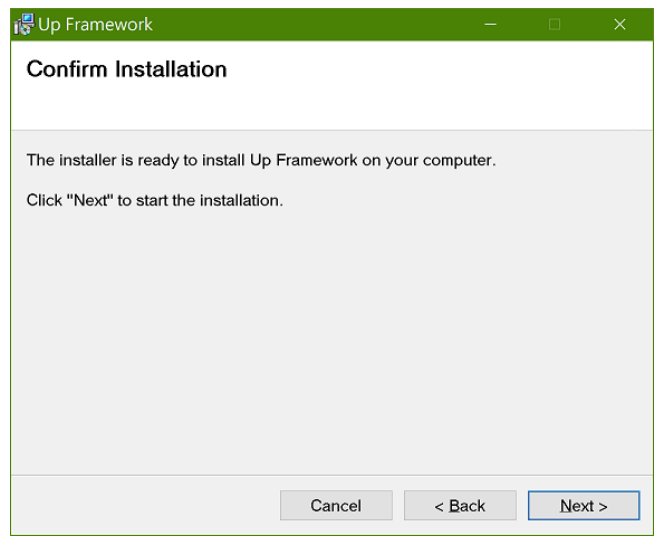
Select the installation folder. Default destination path is C:\Program Files(x86)\AAEON\

You may also choose to install the UP Framework SDK for all users or only the current user. Press "Next" to continue installation.



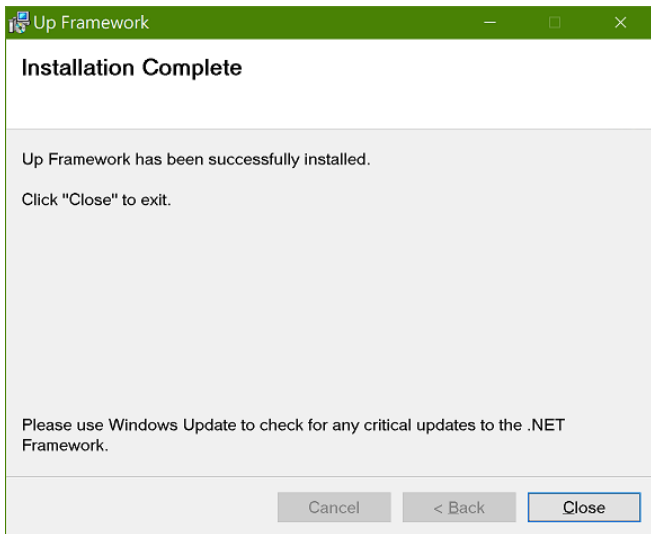
Step 3

Press "Next" to confirm the installation.



Step 4

Press "Close" to exit once setup is complete.



Appendix B

Cables and Connectors

B.1 Cables and Connectors

This table provides detailed information about the cables and connectors used by the NEZHA (NEZHA-N97). If you have any questions about the configuration of your board, please contact your AAEON sales representative.

Label	Conn PN	Description	Mating Cable P/N	Mating Cable Desc
CN1	1655X00019	RTC Battery Connector	175011301K	Lithium Battery.CR2032H .3V.240MaH.w/cable 90mm. DIP.Battery.power.BP-CR2032 -M90-001
CN2	1652814207	GbE RJ-45		
CN3	16530X0041	40-pin HAT Connector		
CN5	16549X0019	Type A.USB3.2 x1 + HDMI Type A x1		
CN6	1654801832	Type A.USB3.2 x2		
CN7	1655X00031	USB 2.0/UART 1x10P Wafer	170010015G	USB Cable.10P 1.0mm Housing.USB A(F).15cm
CN8	1652503109	DC Power Jack		
CN9	1655X00040	Wafer Box.4P. Front Panel (Power on + Reset)	170X000543	Cable.4P.SWITCH CABLE.200mm. FLYINGWAY. FWAA-1561
CN10	1655102010	DC Wafer Box.2P		
CN11	1655802020	WAFER BOX.2P. Fan Connector		
SW1	1601000990	Power Button		