UP TWL

Maker Board

User's Manual 1st Ed

Last Updated: June 12, 2025

Copyright Notice

Acknowledgement

Packing List

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

Item	Quantity
● UP TWL 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.

FCC Statement

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 主板/子板/背板 QO4-381 Rev.A2

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	×	○	○	○	○	○
外部信号连接器及线材	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：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GB/T 26572标准规定的限量要求以下。

×：表示该有害物质的某一均质材料超出了GB/T 26572的限量要求，然而该部件仍符合欧盟指令2011/65/EU 的规范。

环保使用期限(EFUP (Environmental Friendly Use Period)) : 10年

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。

China RoHS Requirement (EN)

Name and content of hazardous substances in product

AAEON Main Board/Daughter Board/Backplane QO4-381 Rev.A2

Part Name	Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCB Assemblies	×	O	O	O	O	O
Connector and Cable	×	O	O	O	O	O

The table is prepared in accordance with the provisions of SJ/T 11364.

O：Indicates that said hazardous substance contained in all of the homogenous materials for this product is below the limit requirement of GB/T 26572.

×：Indicates that said hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement of GB/T 26572. But this product still be compliance with 2011/65/EU Directive (allowed with 2011/65/EU Annex III of RoHS exemption with number 6(c),7(a),7(c)-1).

EFUP (Environment Friendly Use Period) value: 10 years

Notes: This product defined period of use is under normal condition.

Table of Contents

Chapter 1

Product Specifications

1.1 Specifications

System	
Processor	Intel® Core™ 3 Processor N355
	Intel® Processor N250
	Intel® Processor N150
	(formerly Twin Lake)
Graphics	Intel® UHD Graphics
Memory	Dual-Channel LPDDR5, up to 8GB
Storage	Up to 64GB eMMC
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 (default)/ATX
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)

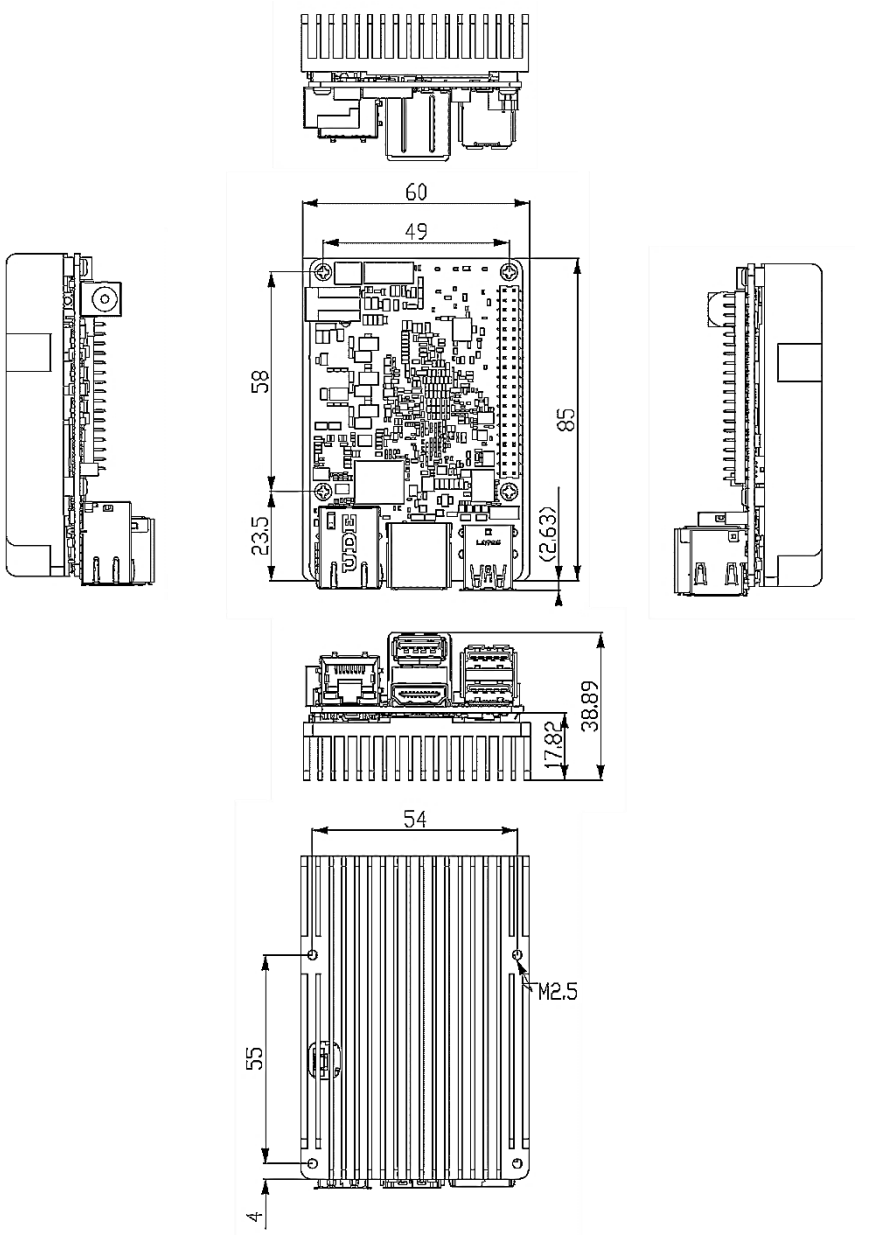
Environment

Operating Temperature	32°F ~ 140°F (0°C ~ 60°C) / 0.5 airflow
	WiTAS1 -4°F ~ 158°F (-20°C ~ 70°C) with active cooler
Operation Humidity	0% ~ 90% relative humidity, non-condensing
MTBF	685,218 Hours
Certification	CE/FCC Class A, RoHS Compliant, REACH

Chapter 2

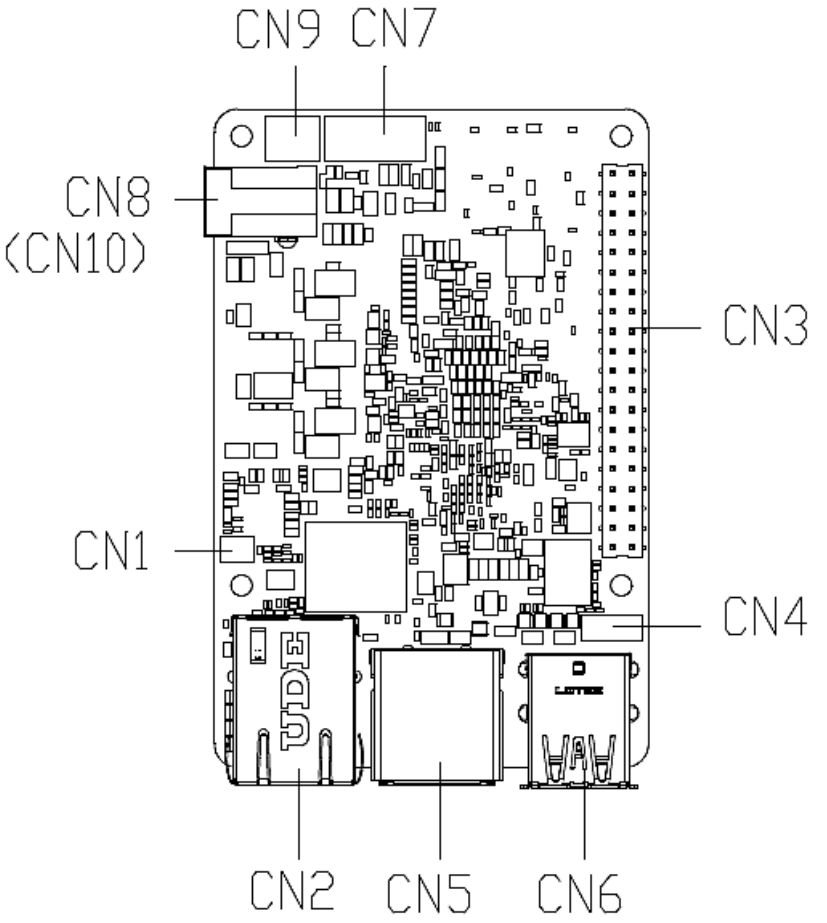
Hardware Information

2.1 Dimensions

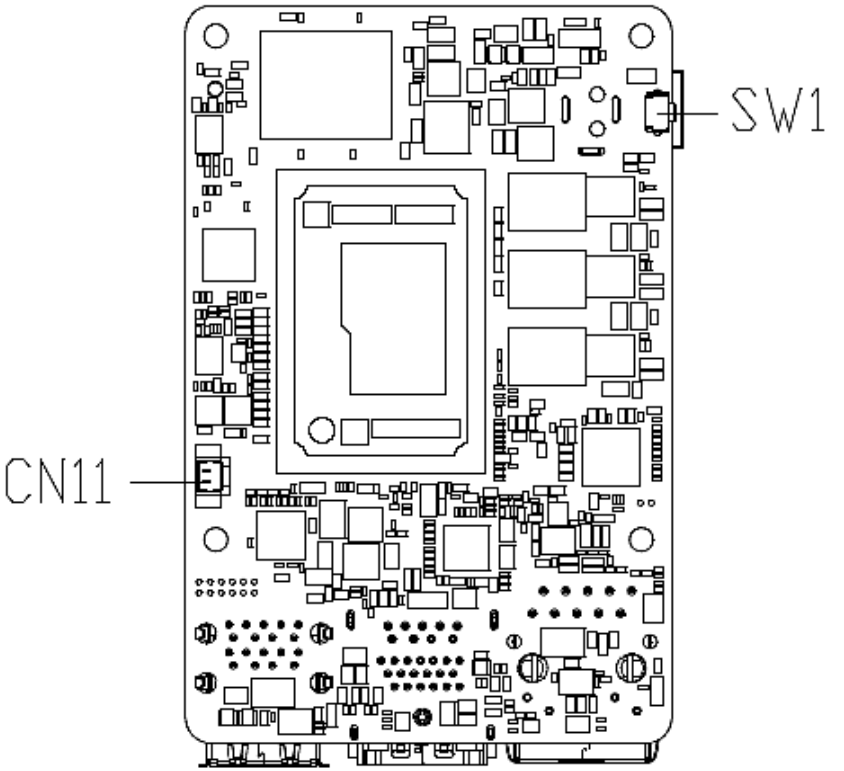


2.2 Jumpers and Connectors

Top:



Bottom:

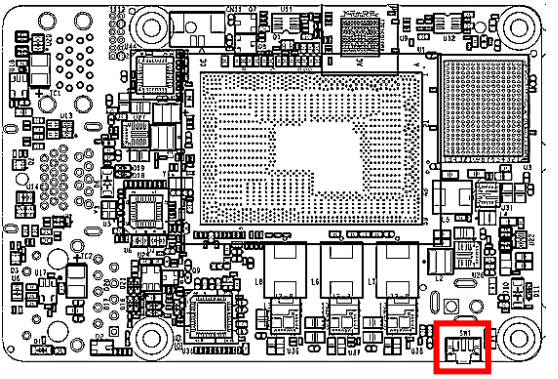


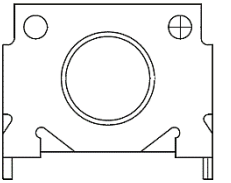
2.3 List of Jumpers and Connectors

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

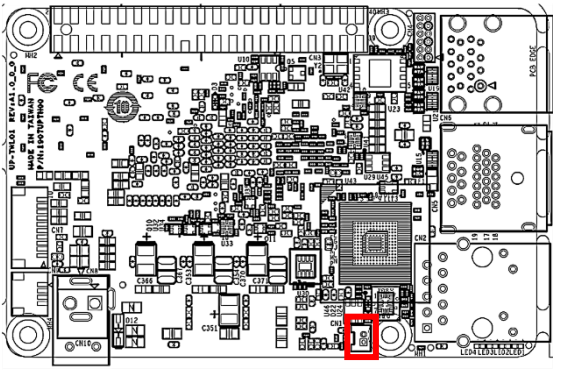
2.3.1 Power Button (SW1)

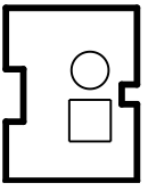




Pin	Signal	Pin	Signal
1	PWR_SW#	2	GND

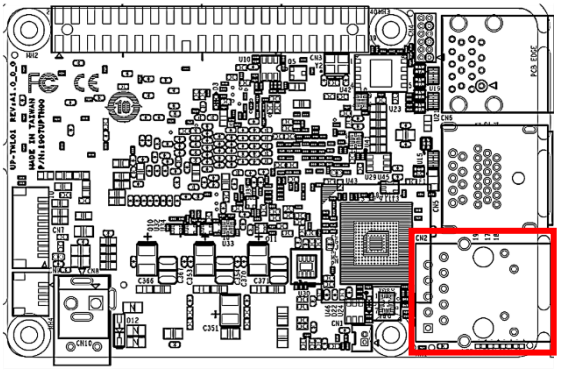
2.3.2 RTC (CN1)

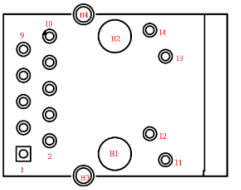




Pin	Signal	Pin	Signal
1	RTC_VCC	2	GND

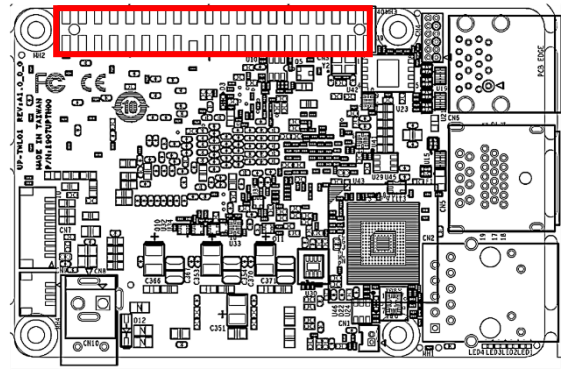
2.3.3 LAN Port (CN2)

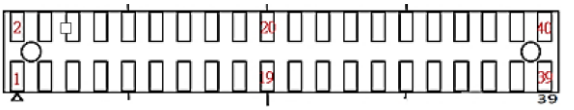




Pin	Signal	Pin	Signal
1	LAN1_MDI0+	2	LAN1_MDI0-
3	LAN1_MDI1+	4	LAN1_MDI1-
5	CT_GND	6	CT_GND
7	LAN1_MDI2+	8	LAN1_MDI2-
9	LAN1_MDI3+	10	LAN1_MDI3-
11	LAN Link LED 1000#	12	LAN Link LED 100#
13	LAN Active LED_N	14	LAN Active LED_P
H1	NC	H2	NC
H3	Chassis GND	H4	Chassis GND

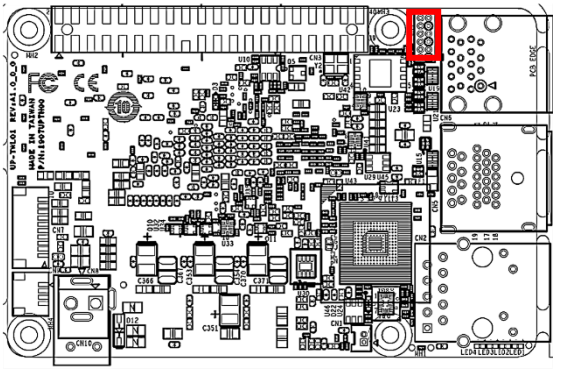
2.3.4 HAT 40 (CN3)

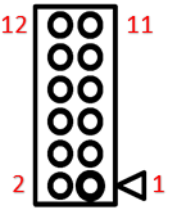




Pin	Signal	Pin	Signal
1	+3.3V	2	+5V
3	I2C1_DAT / GPIO1	4	+5V
5	I2C1_CLK / GPIO2	6	GND
7	ANALOG_DATA / GPIO3	8	UART_TX / GPIO16
9	GND	10	UART_RX / GPIO17
11	UART_RTS / GPIO4	12	I2S_BCLK / GPIO18
13	GPIO5	14	GND
15	GPIO6	16	GPIO19
17	+3.3V	18	GPIO20
19	SPI_MOSI / GPIO7	20	GND
21	SPI_MISO / GPIO8	22	GPIO21
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	UART_CTS / GPIO26
37	GPIO15	38	I2S_SDI / GPIO27
39	GND	40	I2S_SDO / GPIO28

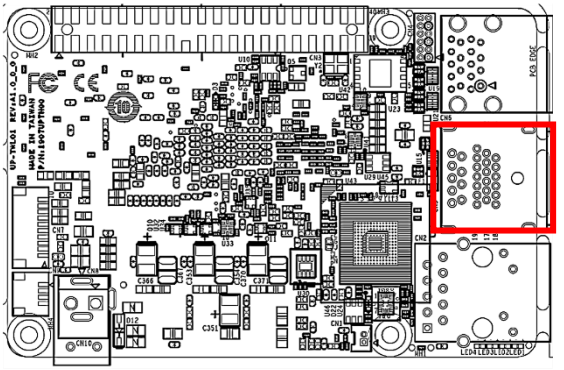
2.3.5 CPLD/BIOS Update (CN4)

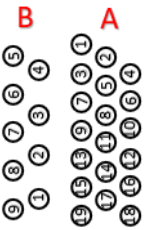




Pin	Signal	Pin	Signal	Pin	Signal
1	JTAG_TCK	2	GND	3	JTAG_TDO
4	1.8V	5	JTAG_TMS	6	SPI_CS
7	SPI_CLK	8	SPI_MISO	9	JTAG_TDI
10	GND	11	SPI_MOSI	12	SPI_HOLD

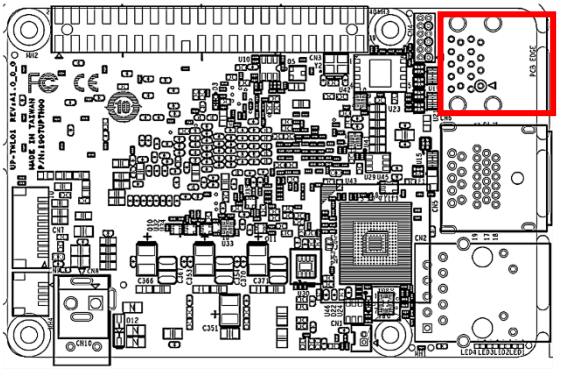
2.3.6 HDMI/USB (Type-A) (CN5)

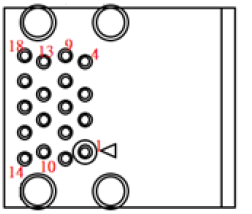




Pin	Signal	Pin	Signal
A1	HDMI_TMDS_TXP2	A2	GND
A3	HDMI_TMDS_TXN2	A4	HDMI_TMDS_TXP1
A5	GND	A6	HDMI_TMDS_TXN1
A7	HDMI_TMDS_TXP0	A8	GND
A9	HDMI_TMDS_TXN0	A10	HDMI_TMDS_Clock_P
A11	GND	A12	HDMI_TMDS_Clock_N
A13	NC	A14	NC
A15	HDMI_DDC_Clock	A16	HDMI_DDC_Data
A17	GND	A18	5V@1A for HDMI
A19	HDMI Hot Plug detect 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		

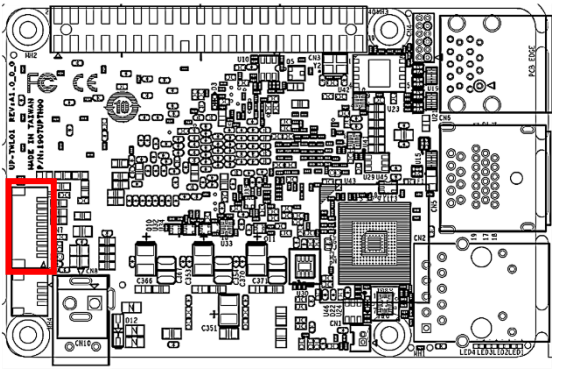
2.3.7 Dual USB Port (Type-A) (CN6)





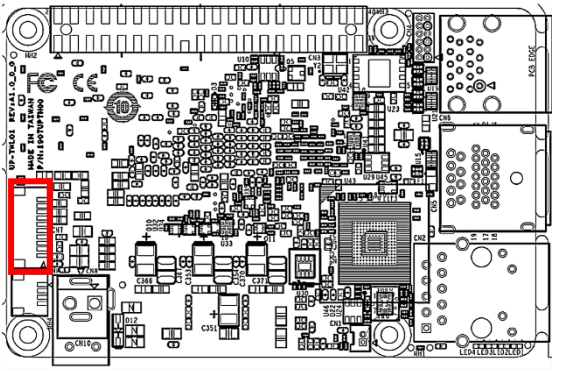
Pin	Signal	Pin	Signal
1	5V@0.9A for USB 3.2	2	USB2.0_DN1
3	USB2.0_DP1	4	GND
5	USB3.2_RXN1	6	USB3.2_RXP1
7	GND	8	USB3.2_TXN1
9	USB3.2_TXP1	10	5V@0.9A for USB 3.2
11	USB2.0_DN2	12	USB2.0_DP2
13	GND	14	USB3.2_RXN2
15	USB3.2_RXP2	16	GND
17	USB3.2_TXN2	18	USB3.2_TXP2
H1	GND	H2	GND
H3	GND	H4	GND

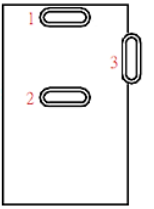
2.3.8 USB 2.0/UART 1x10P Wafer (CN7)



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				

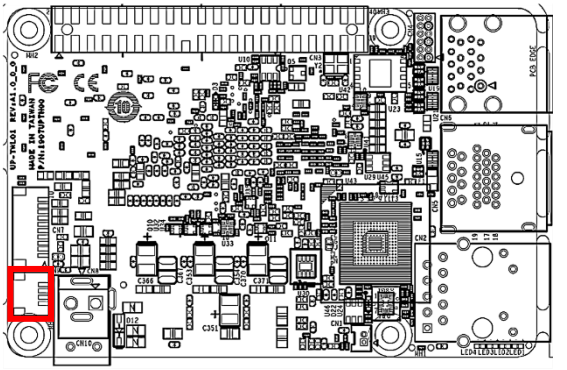
2.3.9 DC Power Jack (CN8)

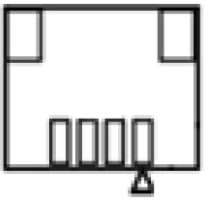




Pin	Signal	Pin	Signal
1	12V	2	GND
3	GND		

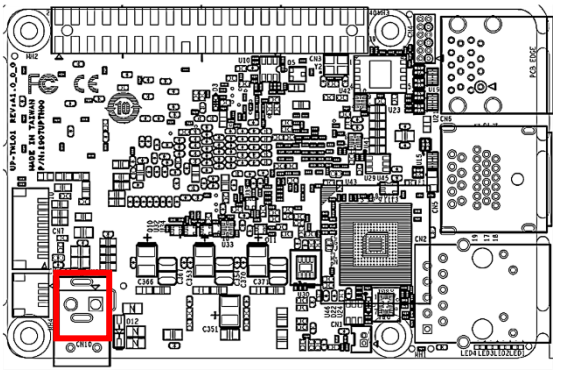
2.3.10 Front Panel (1x4P Wafer) (CN9)

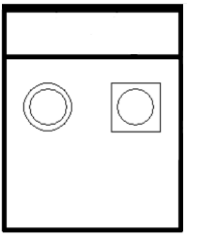




Pin	Signal	Pin	Signal
1	Power Button#	2	GND
3	Reset Button#	4	GND

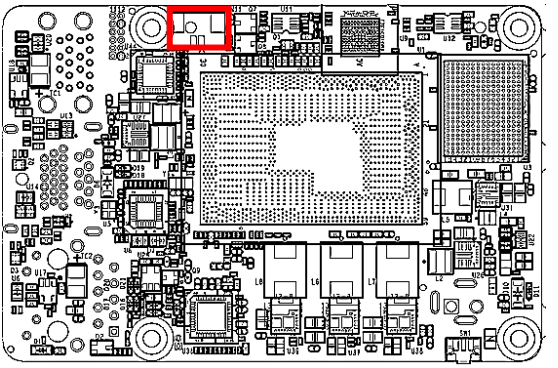
2.3.11 DC Power Wafer (CN10)

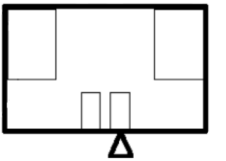




Pin	Signal	Pin	Signal
1	12V	2	GND

2.3.12 Fan Connector (CN11)





Pin	Signal	Pin	Signal
1	12V	2	GND

Chapter 3

Software Installation

3.1 Linux Setup

The UP TWL supports Linux operating systems (see Chapter 1 for specifications). For instructions on how to install a Linux OS onto your UP TWL, you can find several guides and tutorials in the wiki section of the UP Board website at https://up-board.org for both installing supported distributions as well as porting your own Linux build.

3.2 Windows Drivers Installation

Drivers for the UP TWL can be downloaded from the AAEON website by following the link https://www.aaeon.com/tw/product/detail/up-boards-up-twl/download and navigating to the Downloads section, then clicking on the UP TWL to find all relevant drivers.

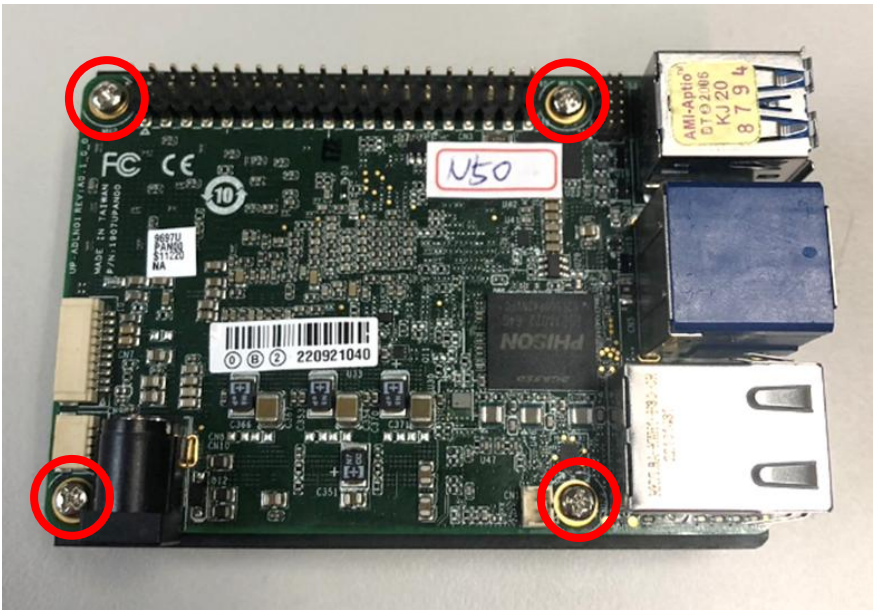
Chapter 4

Mechanical Installation

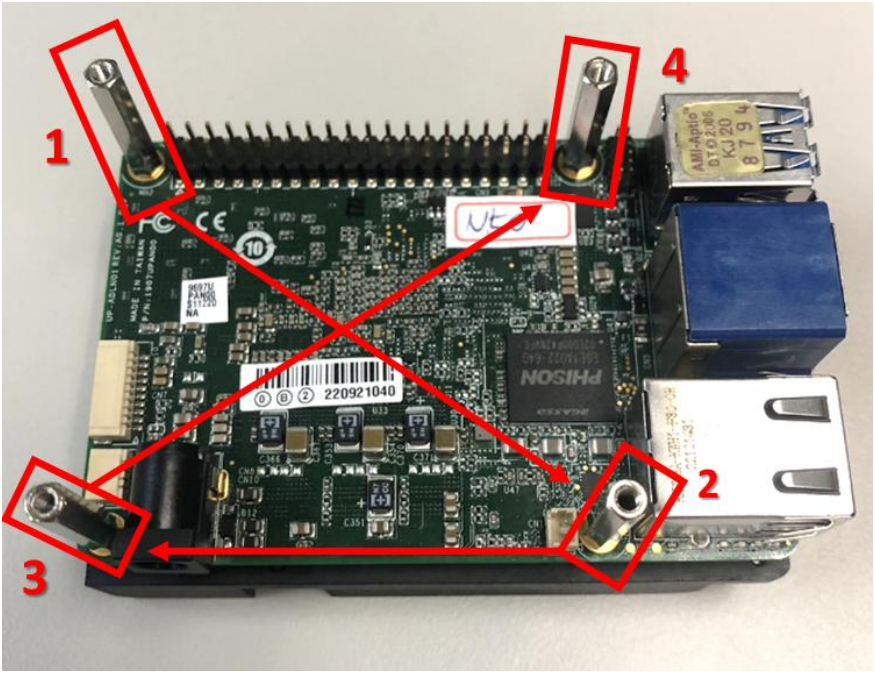
4.1 Board Pillar Installation

4.1.1 Option 1

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

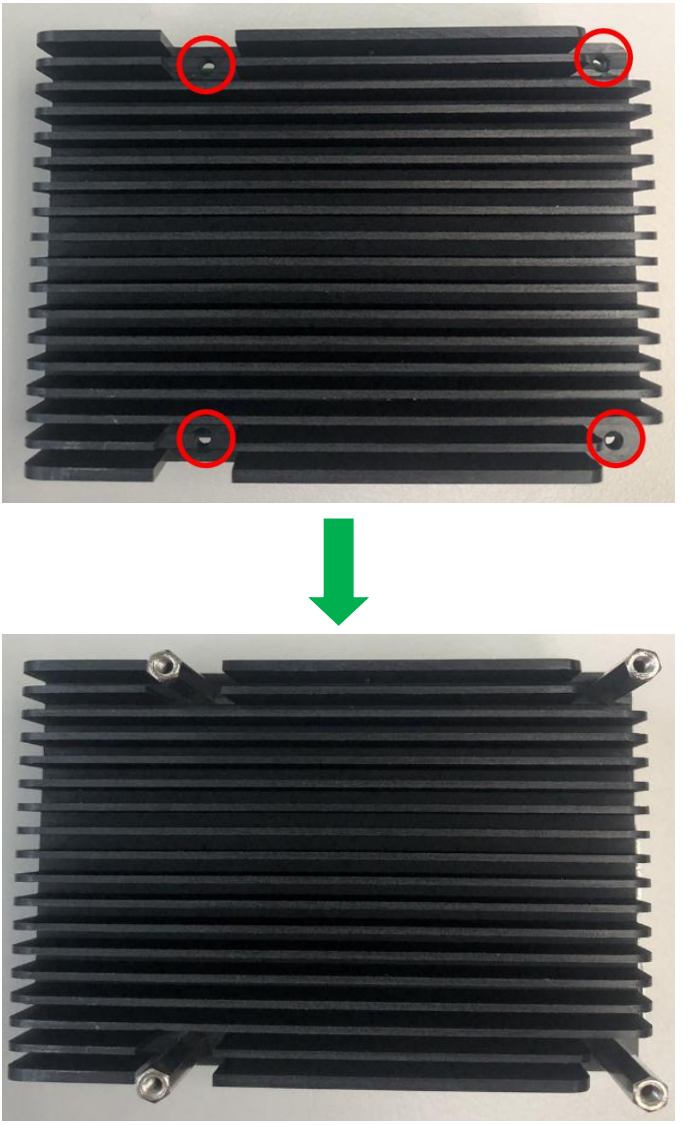


Step 2: Affix and lock the four (4) pillars to the board in the following sequence.



4.1.2 Option 2

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



Appendix A

UP Framework SDK Installation

A.1 Introduction

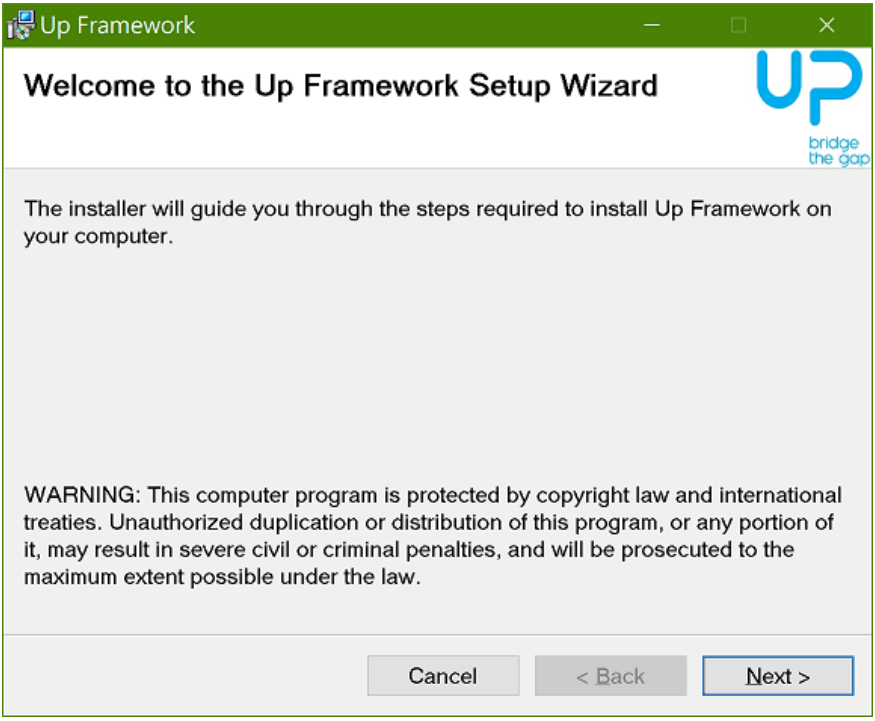
This section provides instructions for the installation of the UP Framework SDK. Instructions are provided for Windows 10. You can download the latest version of UP Framework SDK from the UP community:

https://downloads.up-community.org/download/up-sdk-for-windows-10-and-windows-iot/

A.2 Installation for Windows 10

Step 1

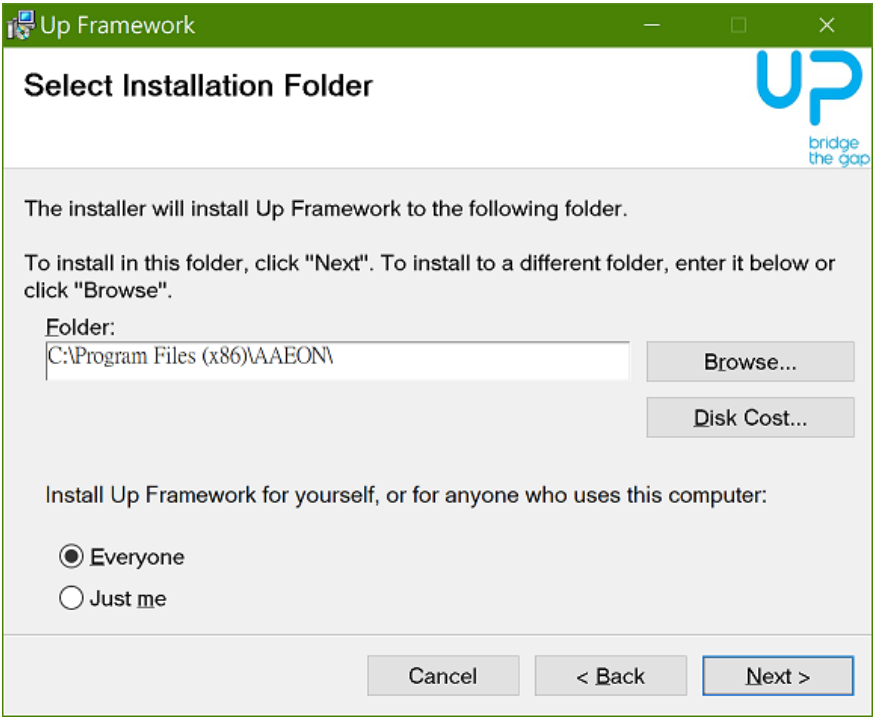
Locate the downloaded file UpFrameworkSetup.msi and run the installer. Press "Next" to begin the setup process.



Step 2

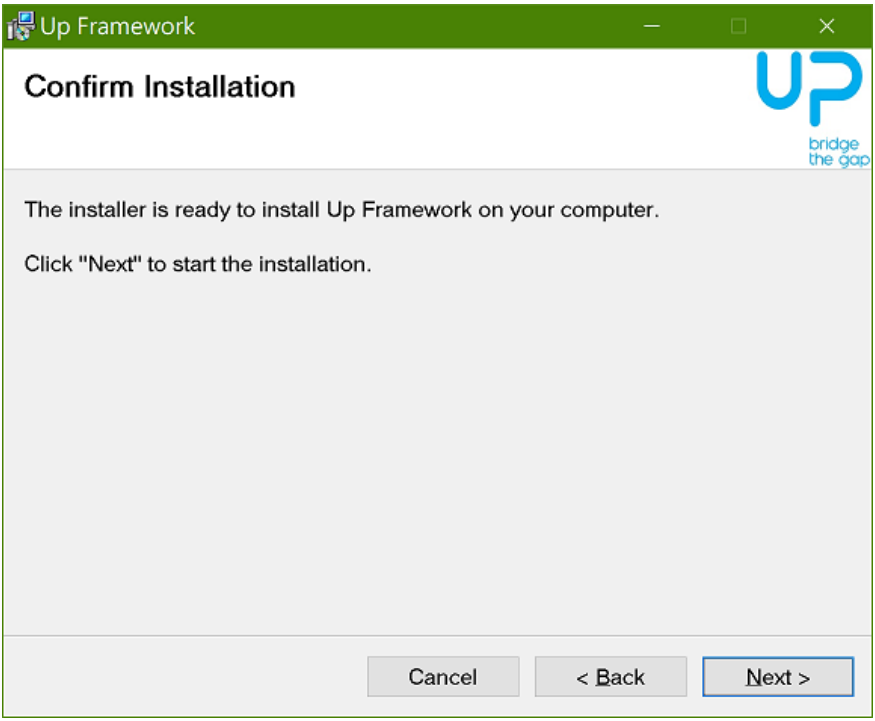
Select the installation folder. Default destination path is C:\Program Files(x86)\AAEON\

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



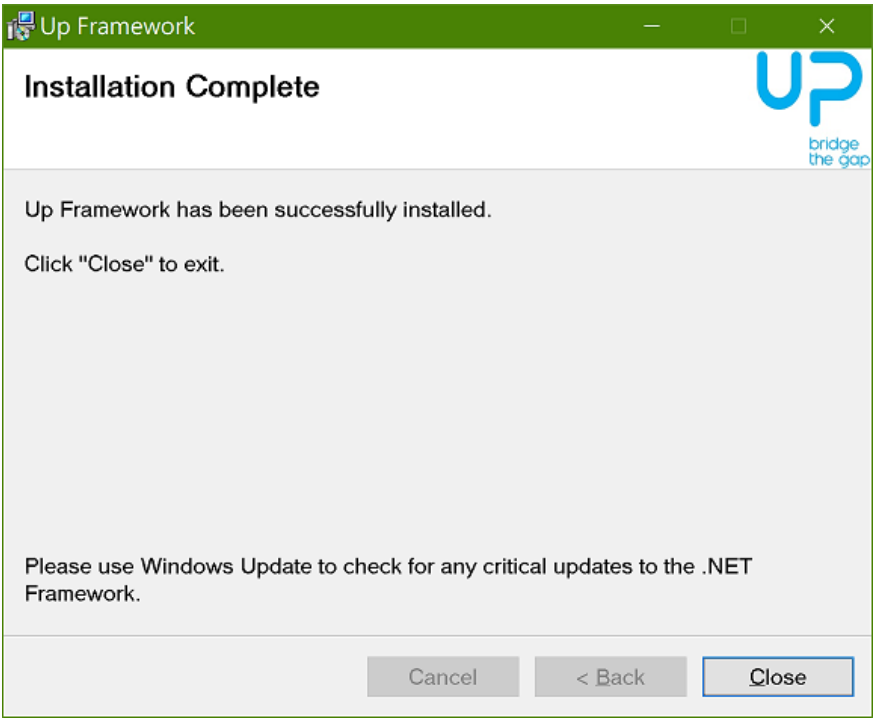
Step 3

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 UP TWL. If you have any questions about the configuration of your board, please contact your AAEON sales representative.

Connector Label	Function	Mating Connector	
		Vendor	Model No.
CN1	RTC Battery	Molex	51021-0200
CN3	40-pin HAT	JCTC	12541H00-2X10PA
CN4	CPLD/BIOS update	Astron	27-4121-206
CN7	USB 2.0/UART	JCTC	11002H00-10P
CN8	DC Power Jack	N/A	N/A
CN9	Front Panel	JCTC	11002H00-4P
CN11	Fan CONN	JCTC	11251H00-2P

Connector Label	Description	AAEON Cable/PN	Mating Cable Description
CN1	RTC Battery Connector	175011301K	Lithium Battery.CR2032H.3V.240mAH.w/cable 90mm. DIP.Battery power.BP-CR2032-M90-001
CN3	40-pin HAT Connector	170X000277	Cable.40P.Pitch=3.81mm.16P-to-40P header.300mm.FLYINGWAY.FWAA-1418
CN4	BIOS Update Connector	170X000132	Cable.2*7P TO 2*6P.Pitch=1.27mm.SPI Cable.150mm.FLYINGWAY.FWAA-1279
CN7	Wafer Box.10P. USB/UART port	170010015G	USB Cable.10P 1.0mm Housing.USB A
CN8	DC Power Jack 2.5Φ/2.0Φ	N/A	
CN9	Wafer Box.4P. Front Panel (Power on + Reset)	N/A	
CN11	Wafer Box.2P. Fan Connector	N/A	