

# UP-APL01

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Maker Board

User's Manual 4<sup>th</sup> Ed

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## Packing List

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

Item	Quantity
● UP-APL01	1

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

## About this Document

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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 [AAEON.com](http://AAEON.com) for the latest version of this document.

## Safety Precautions

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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	○	○	○	○	○	○
外部信号 连接器及线材	○	○	○	○	○	○
<p>O: 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	○	○	○	○	○	○
Wires & Connectors for External Connections	○	○	○	○	○	○
<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><b>Note:</b> The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p>						

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# Chapter 1

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Product Specifications

## 1.1 Specifications

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### System

● Form Factor	85.6 x 90mm
● CPU	Intel® Celeron™ N3350 Processor Intel® Pentium™ N4200 Processor
● CPU Frequency	Intel® Celeron™ N3350 Processor (2M Cache, 1.10 GHz up to 2.40 GHz) Intel® Pentium™ N4200 Processor (2M Cache, 1.10 GHz up to 2.50 GHz)
● Chipset	Processor integrated
● Memory Type	Onboard Single/Dual Channel LPDDR4 memory, Max 8GB
● Max Memory Capacity	8 GB
● BIOS	SPI BIOS — 128Mb Flash
● Power Requirement	5V DC Only
● Power Supply Type	DC-In
● Power Consumption (Typical)	2W ~ 15W
● Dimensions (L x W)	85.6 x 90mm
● Operating Temperature	0 ~ 60°C (32 ~ 140°F)
● Operation Humidity	10 ~ 80% relative humidity, non-condensing
● Certification	CE/FCC Class A
● OS Support	Microsoft Windows 10 (full), Windows IOT Core, Linux (ubinux, Ubuntu, Yocto), Android

## Display

- **VGA/LCD Controller** Intel® HD Graphics

## I/O

- **Ethernet** Realtek RTL8111G-CG
- **Audio** HDMI I2S  
DP
- **USB** USB 3.0 OTG x 1  
USB 3.0 x 3
- **Onboard eMMC** 16 GB / 32 GB / 64 GB / 128GB
- **Expansion Slot** HAT 40 GPIO Pin  
ext-HAT connector 60 pin  
Mini Card (Full-size) (auto switch with mSATA)  
M.2 2230/ E Key

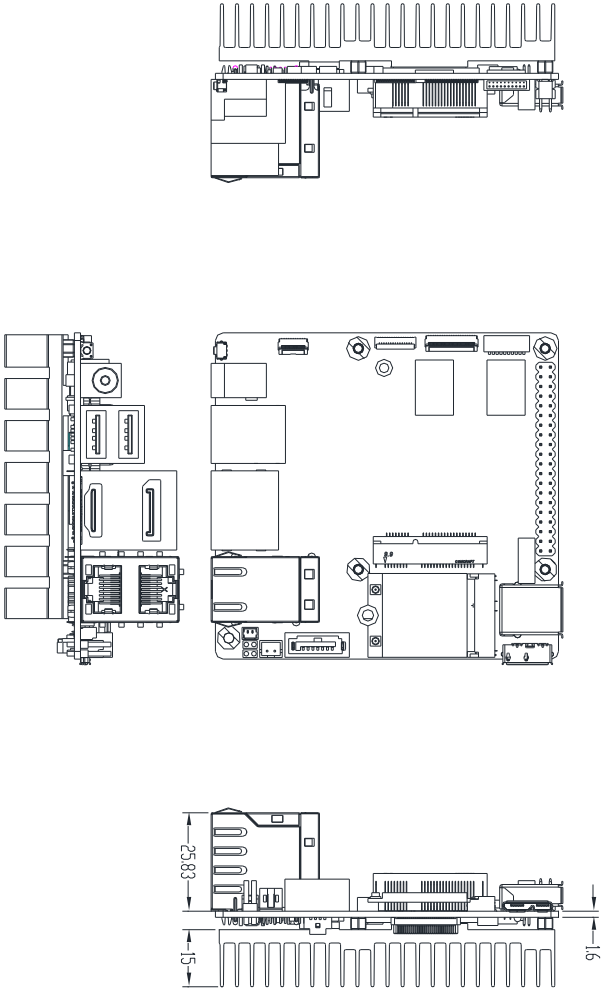
# Chapter 2

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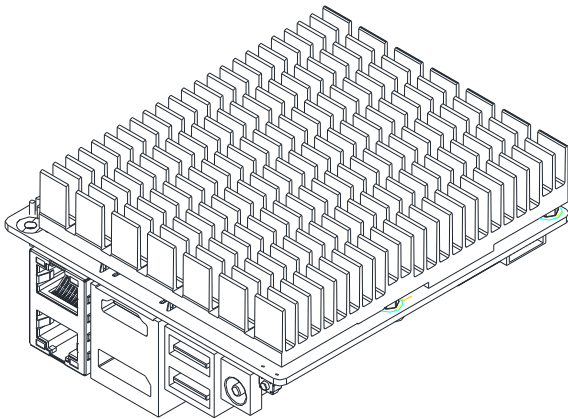
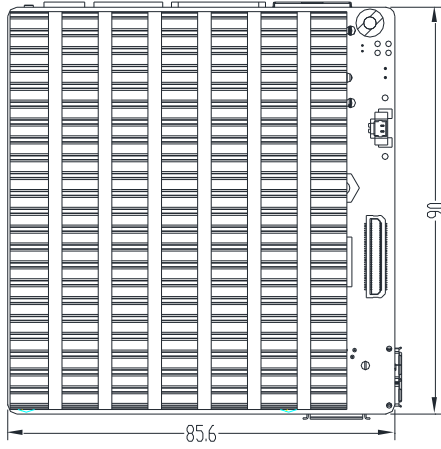
Hardware Information



## 2.1 Dimensions

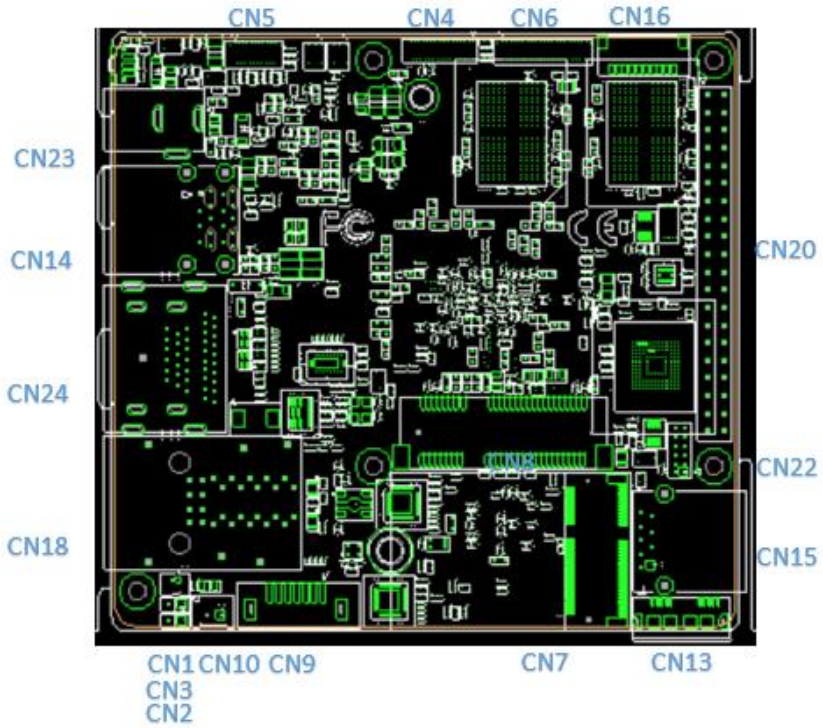


## 2.1.1 Heatsink

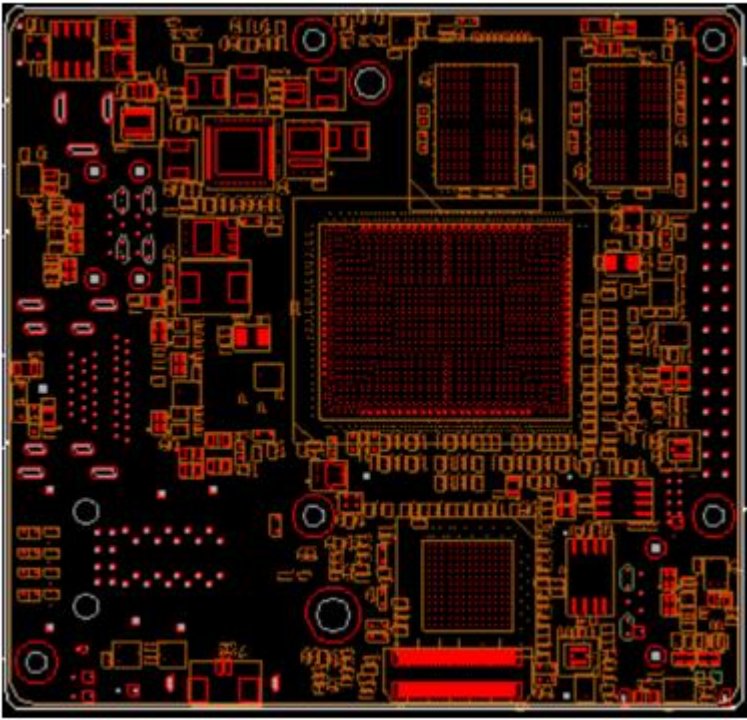


## 2.2 Jumpers and Connectors

Top:



Bottom:



CN17

CN21

## 2.3 List of Jumpers and Connectors

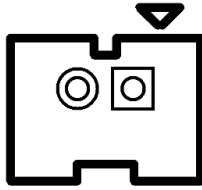
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Please refer to the table below for all of the board's jumpers that you can configure for your application

Label	Function
CN1	RTC
CN2	POWER BUTTON
CN3	RESET
CN4	CAMERA
CN5	CAMERA
CN6	eDP
CN7	M.2 E-KEY
CN8	mini Card
CN9	SATA
CN10	SATA POWER
CN13	USB3 OTG
CN14	USB3 DUAL PORT
CN15	USB3
CN16	USB panel
CN17	FAN
CN18	LAN DUAL PORT
CN20	HAT40
CN21	EXHAT
CN22	CPLD and BIOS update
CN23	DC JACK
CN24	HDMI + DP PORT

### 2.3.1 RTC Battery (CN1)

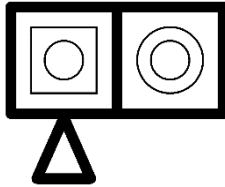
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Pin	Signal
1	3.3V
2	GND

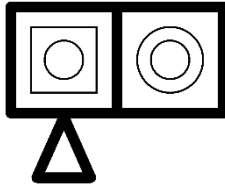
### 2.3.2 Power Button (CN2)

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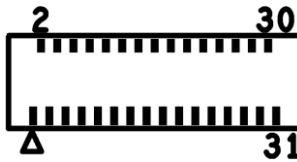
Pin	Signal
1	PWRBTN #
2	GND

### 2.3.3 Reset (CN3)



Pin	Signal
1	RESET #
2	GND

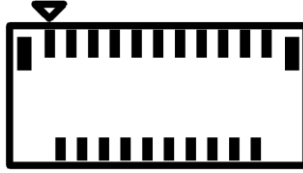
### 2.3.4 Camera (CN4)



Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	RESET #	3	NC
4	I2C_DAT	5	I2C_CLK	6	GND
7	CLOCK	8	GND	9	data negative 0
10	data positive 0	11	GND	12	data negative 1
13	data positive 1	14	GND	15	clock negative
16	clock positive	17	GND	18	data negative 2
19	data positive 2	20	GND	21	data negative 3
22	data positive 3	23	GND	24	2.8V

25	GND	26	1.2V	27	1.8V
28	GND	29	2.8V	30	2.8V
31	GND	32		33	

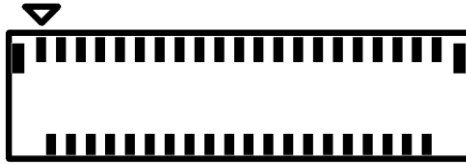
### 2.3.5 Camera 1 (CN5)



Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	data negative 1	3	data positive 1
4	GND	5	clock negative	6	clock positive
7	GND	8	data negative 0	9	data positive 0
10	GND	11	1.2V	12	1.8V
13	GND	14	CLOCK	15	GND
16	I2C_CLK	17	I2C_DAT	18	RESET #
19	RESET #	20	2.8V	21	GND

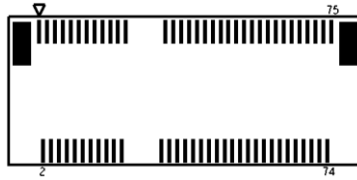


### 2.3.6 eDP (CN6)



Pin	Signal	Pin	Signal	Pin	Signal
1	NC	2	NC	3	GND
4	NC	5	NC	6	GND
7	NC	8	NC	9	GND
10	NC	11	NC	12	GND
13	NC	14	NC	15	GND
16	data positive 0	17	data negative 0	18	GND
19	data positive 1	20	data negative 1	21	GND
22	data positive 2	23	data negative 2	24	GND
25	data positive 3	26	data negative 3	27	GND
28	AUX positive	29	AUX negative	30	GND
31	Hot Plug Detect	32	Back Light Control	33	VDD Enable
34	Back Light Enable	35	I2C_CLK	36	I2C_DAT
37	3.3V	38	3.3V	39	3.3V
40	3.3V	41	3.3V		

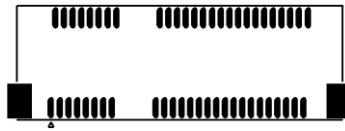
### 2.3.7 M.2 E-KEY (CN7)



Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	3.3V	3	USB_D+
4	3.3V	5	USB_D-	6	NC
7	GND	8	NC	9	NC
10	NC	11	NC	12	NC
13	NC	14	NC	15	NC
16	NC	17	NC	18	GND
19	NC	20	NC	21	NC
22	UART_RXD	23	NC	24	N/A
25	N/A	26	N/A	27	N/A
28	N/A	29	N/A	30	N/A
31	N/A	32	UART0_TXD	33	GND
34	UART0_CTS	35	PCIE_C_TXP3	36	UART0_RTS
37	PCIE_C_TXN3	38	NC	39	GND
40	NC	41	PCIE_RXP3	42	NC
43	PCIE_RXN3	44	NC	45	GND
46	NC	47	CLK_PCIE_M2_P	48	NC
49	CLK_PCIE_M2_N	50	Suspend Clock	51	GND
52	RESET #	53	PCIE_M2_CLKREQ	54	Bluetooth Enable
55	WAKE #	56	Wi-Fi Enable	57	GND
58	SMBus_DAT	59	NC	60	SMBus_CLK

61	NC	62	SMBus_Alert	63	GND
64	NC	65	NC	66	NC
67	NC	68	NC	69	GND
70	NC	71	NC	72	3.3V
73	NC	74	3.3V	75	GND

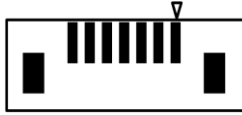
### 2.3.8 Mini Card (CN8)



Pin	Signal	Pin	Signal	Pin	Signal
1	WAKE #	2	3.3V	3	NC
4	GND	5	INT_SERIRQ	6	1.5V
7	PCIE_MINI_CLKREQ	8	NC	9	GND
10	NC	11	CLK_PCIE_MINI_N	12	NC
13	CLK_PCIE_MINI_P	14	NC	15	GND
16	NC	17	NC	18	GND
19	NC	20	3G Enable	21	GND
22	RESET #	23	PERn0_mSATA_R+	24	3.3V
25	PERp0_mSATA_R-	26	GND	27	GND
28	1.5V	29	GND	30	I2C_CLK
31	PETr0_mSATA_T-	32	I2C_DAT	33	PETp0_mSATA_T+
34	GND	35	GND	36	USB_D-
37	GND	38	USB_D+	39	3.3V
40	GND	41	3.3V	42	NC
43	mSATA_PCl_e_SEL_C	44	NC	45	NC

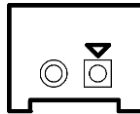
46	NC	47	NC	48	1.5V
49	NC	50	GND	51	NC
52	3.3V				

### 2.3.9 SATA (CN9)



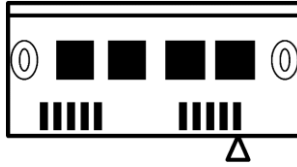
Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	TX+	3	TX-
4	GND	5	RX-	6	RX+
7	GND	8	GND	9	GND

### 2.3.10 SATA (CN10)



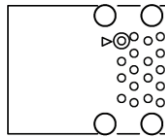
Pin	Signal
1	5V
2	GND

### 2.3.11 USB3 OTG (CN13)



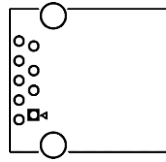
Pin	Signal	Pin	Signal	Pin	Signal
1	5V	2	USB2_D-	3	USB2_D+
4	ID	5	GND	6	USB3_RX-
7	RSB3_RX+	8	GND	9	USB3_TX-
10	USB3_TX+	11		12	

### 2.3.12 USB DUAL PORT (CN14)



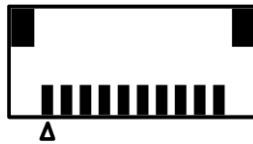
Pin	Signal	Pin	Signal	Pin	Signal
1	5V	2	USB2_D1-	3	USB2_D1+
4	GND	5	USB3_RX1-	6	USB3_RX1+
7	GND	8	USB3_TX1-	9	USB3_TX1+
10	5V	11	USB2_D2-	12	USB2_D2+
13	GND	14	USB3_RX2-	15	USB3_RX2+
16	GND	17	USB3_TX2-	18	USB3_TX2+

### 2.3.13 USB 13 (CN15)



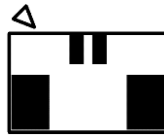
Pin	Signal	Pin	Signal	Pin	Signal
1	5V	2	USB2_D-	3	USB2_D+
4	GND	5	USB3_RX-	6	USB3_RX+
7	GND	8	USB3_TX-	9	USB3_TX+

### 2.3.14 USB Panel (CN16)



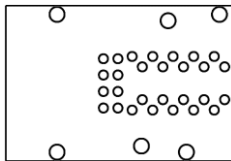
Pin	Signal	Pin	Signal	Pin	Signal
1	5V	2	USB2_D1-	3	USB2_D1+
4	GND	5	5V	6	USB2_D2-
7	USB2_D2+	8	GND	9	UART_RX
10	UART_TX				

### 2.3.15 FAN (CN17)



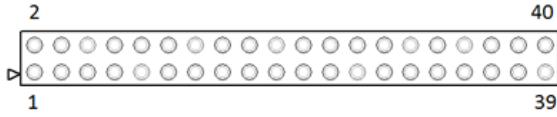
Pin	Signal	Pin	Signal
1	5V	2	GND

### 2.3.16 LAN Dual Port (CN18)



Pin	Signal	Pin	Signal	Pin	Signal
R1A	LAN1_MDI0+	R2A	LAN1_MDI0-	R3A	LAN1_MDI1+
R4A	LAN1_MDI1-	R5A	LAN1_MDI2	R6A	LAN1_MDI2-
R7A	LAN1_MDI3+	R8A	LAN1_MDI3-	R9A	GND
R10	GND	L1A	LAN1_ACTL	L2A	LAN1_ACTLED+
L3A	LAN1_LINK1000	L4A	LAN1_LINK1	R1B	LAN2_MDI0+
R2B	LAN2_MDI0-	R3B	LAN2_MDI1	R4B	LAN2_MDI1-
R5B	LAN2_MDI2+	R6B	LAN2_MDI2	R7B	LAN2_MDI3+
R8B	LAN2_MDI3-	R9B	GND	R10B	GND
L1B	LAN2_ACTLED-	L2B	LAN2_ACTL	L3B	LAN2_LINK1000#
L4B	LAN2_LINK100#				

### 2.3.17 HAT 40 (CN20)

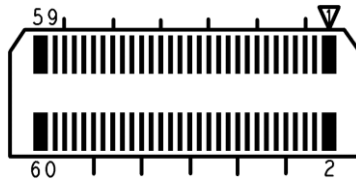


Pin	Signal	BIOS
1	3V3	
2	5V	
3	GPIO0/I2C1_SDA	GPIO1
4	5V	
5	GPIO1/I2C1_SCL	GPIO2
6	GND	
7	GPIO2/ADC_in1	GPIO3
8	GPIO15/UART_TXD	GPIO16
9	GND	
10	GPIO16/UART_RXD	GPIO17
11	GPIO3/UART_RTS/ADC_in2	GPIO4
12	GPIO17/I2S_BCLK	GPIO18
13	GPIO4/ADC_in3	GPIO5
14	GND	
15	GPIO5/ADC_in4	GPIO6
16	GPIO18	GPIO19
17	3V3	
18	GPIO19	GPIO20
19	GPIO6/SPI_1_TXD	GPIO7
20	GND	
21	GPIO7/SPI_1_RXD	GPIO8



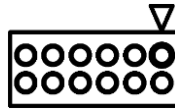
22	GPIO20	GPIO21
23	GPIO8/SPI_1_CLK	GPIO9
24	GPIO21/SPI_1_FS0	GPIO22
25	GND	
26	GPIO22/SPI_1_FS1	GPIO23
27	GPIO9/I2C0_SDA	GPIO10
28	GPIO23/I2C0_SCL	GPIO24
29	GPIO10	GPIO11
30	GND	
31	GPIO11	GPIO12
32	GPIO24/PWM0	GPIO25
33	GPIO12/PWM1	GPIO13
34	GND	
35	GPIO13/I2S_WS_SYNC	GPIO14
36	GPIO25/UART_CTS	GPIO26
37	GPIO14	GPIO15
38	GPIO26/I2S_SDI	GPIO27
39	GND	
40	GPIO27/I2S_SDO	GPIO28

### 2.3.18 EXHAT (CN21)



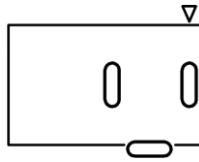
Pin	Signal	Pin	Signal	Pin	Signal
1	GPIO1	2	GPIO2	3	GPIO3
4	GPIO4	5	GND	6	GND
7	GPIO5	8	GPIO6	9	GPIO7
10	GPIO8	11	GND	12	GND
13	GPIO9	14	GPIO10	15	GPIO11
16	GPIO12	17	GND	18	GND
19	GPIO13	20	GPIO14	21	GPIO15
22	GPIO16	23	GND	24	GND
25	PLL_IN-	26	PLL1_OUT-	27	PLL1_IN+
28	PLL1_OUT+	29	GND	30	GND
31	INT_SERIRQ_R	32	LPC_R_CLKOUT0	33	LPC_CLKRU_N
34	GND	35	GND	36	LPC_R_AD3
37	SIO_SPI_1_TXD	38	LPC_R_AD2	39	SIO_SPI_1_RXD
40	LPC_R_AD1	41	SIO_SPI_1_FS0	42	LPC_R_AD0
43	SIO_SPI_1_FS1	44	GND	45	SIO_SPI_1_CLK
46	LPC_FRAME_R	47	GND	48	GND
49	I2C_SCL3_3V3	50	AVS_DMIC_CLK_A1	51	I2C_SDA3_3V3
52	AVS_DMIC_CLK_B1	53	GND	54	AVS_DMIC_CLK_AB2
55	I2C_SCL2_3V3	56	GND	57	I2C_SDA2_3V3
58	AVS_DMIC_DATA_1	59	GND	60	AVS_DMIC_DATA_2

### 2.3.19 CPLD and BIOS update (CN22)



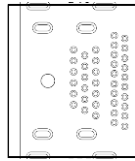
Pin	Signal	Pin	Signal	Pin	Signal
1	JTAG_TCK	2	GND	3	JTAG_TDO
4	1.8V	5	JTAG_TMS	6	SPI_CS
7	SPI_CLK	8	SPI_MISO	9	JTAG_TDI
10	GND	11	SPI_MOSI	12	SPI_HOLD

### 2.3.20 CPLD and BIOS update (CN22)



Pin	Signal	Pin	Signal	Pin	Signal
1	5V	2	GND	3	GND

### 2.3.21 HDMI Dual Port (CN24)



Pin	Signal	Pin	Signal	Pin	Signal
P1	DDI0_TXP_DP_0	P2	GND	P3	DDI0_TXN_DP_0
P4	DDI0_TXP_DP_1	P5	GND	P6	DDI0_TXN_DP_1
P7	DDI0_TXP_DP_2	P8	GND	P9	DDI0_TXN_DP_2
P1	PORT0_CLK+	P11	GND	P12	PORT0_CLK-
P1	CONFIG1	P14	CONFIG2	P15	DP_AUX_P
P1	GND	P17	DP_AUX_N	P18	DDI0_TYPE_C_HPDP
P1	GND	P20	3.3V	P21	DDI1_TXP_HDMI_0
P2	GND	P23	DDI1_TXN_H	P24	DDI1_TXP_HDMI_1
P2	GND	P26	DDI1_TXN_H	P27	DDI1_TXP_HDMI_2
P2	GND	P29	DDI1_TXN_H	P30	DDI1_CLK+_HDMI
P3	GND	P32	DDI1_CLK-_	P33	HDMI1_CEC_D
P3	NC	P35	DDC_CLK	P36	DDC_DATA
P3	GND	P38	5V		DDI1_TYPE_C_HPDP

# Chapter 3

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Drivers Installation

## 3.1 Driver Download and Installation

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\* Please access <https://www.up-community.org> and go to the Downloads section>UP Squared to find the relevant driver.