RICO-MX8P

NXP i.MX 8M Plus Platform

User's Manual 1st Ed

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Packing List

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

Item	Quantity
● RICO-MX8P	1
● RTC Battery	1
● MB Power Cable	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 on 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 WHERE THE STORAGE TEMPERATURE IS BELOW -20° C (-4°F) OR ABOVE 60°C (140°F) TO PREVENT DAMAGE.**

FCC Statement

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	○	○	○	○
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。 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。 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)

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	O	O	O	O
Wires & Connectors for External Connections	X	X	O	O	O	O
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. 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. **Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only**						

Table of Contents

Chapter 1

Product Specifications

1.1 Specifications

System	
Form Factor	Pico-ITX Plus (100mm x 80mm)
CPU	NXP i.MX 8M Plus:
	Quad-Core Arm® Cortex®-A53, 1.6 GHz
	Arm® Cortex®-M7, up to 800MHz
NPU	2.3 TOPS (Optional)
GPU	Vivante GC7000 UltraLite 3D GPU (2 shaders, OpenGL
	ES 3.1, Vulkan, OpenCL 1.2)
	Vivante GC520L 2D GPU
Graphics	**Video Processing Unit (VPU):**
	• 720p60 H.265, VP9 decoder
	• 720p60 H.264, VP8 decoder
	• 720p60 H.265, H.264 encoder
Memory Capacity	Onboard LPDDR4 2GB/4GB/8GB (Optional)
Storage/SSD	16GB eMMC
	Micro SD
Operating System	Debian 11
Kernel	Kernel 5.10 (Debian 11)
Watchdog Timer	Integrated
RTC	RTC Battery Connector x 1
Power Requirement	+12V DC input
Power Consumption (Typical)	0.93A @12V, Full Load, Quad-Core CPU
Dimension	3.94" x 3.15" (100mm x 80mm)
Gross Weight	0.44 lb. (0.2Kg)

System

Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
	Optional: -4°F ~ 158°F (-20°C ~ 70°C)
Storage Temperature	-40˚F ~ 176˚F (-40˚C ~ 80˚C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
MTBF (Hours)	100,000
Certification	CE/FCC

Display

HDMI	HDMI 2.0 x 1
eDP	-
LVDS	4/8 Lane LVDS x 1
MIPI	4-lane MIPI DSI x 1
Display Port	-

RF Function

Wi-Fi/BT	Support via M.2 E-Key

I/O

Ethernet	GbE x 2
	(onboard RJ-45 x 1, via Daughter Board T650 x 1)
USB Port	USB 3.2 Gen 1 Type C OTG x 1
	Dual USB 3.2 Gen 1/USB 2.0 x 1
Serial Port	RS-232/422/485 x 1 (Default: RS-232)
	RS-232 Pin Header x 1
	Debug Port x 1
	UART x 1 (Tx/Rx only)
Audio	3.5mm Audio Combo Jack x 1

I/O

GPIO	GPIO x 8 (2x7 Wafer x 1)
Expansion Slot	Full-size mPCIe Slot x 1 (LTE)
	FPC Connector x 1 (Daughter Board)
SIM Slot	Nano SIM (Push-Push Type with Tray)
SD Socket	Micro SD Card (Push-Push Type)
Camera	4-lane MIPI CSI Interface

1.2   Block Diagram

NXP i.MX 8M Plus Platform   RICO-MX8P

Chapter 1 – Product Specifications   5
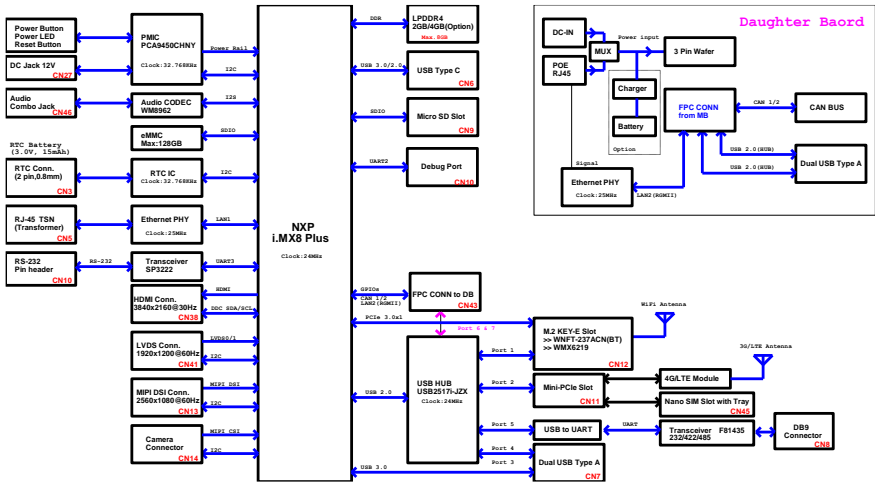
Chapter 2

Hardware Information

2.1 Dimensions

Component Side
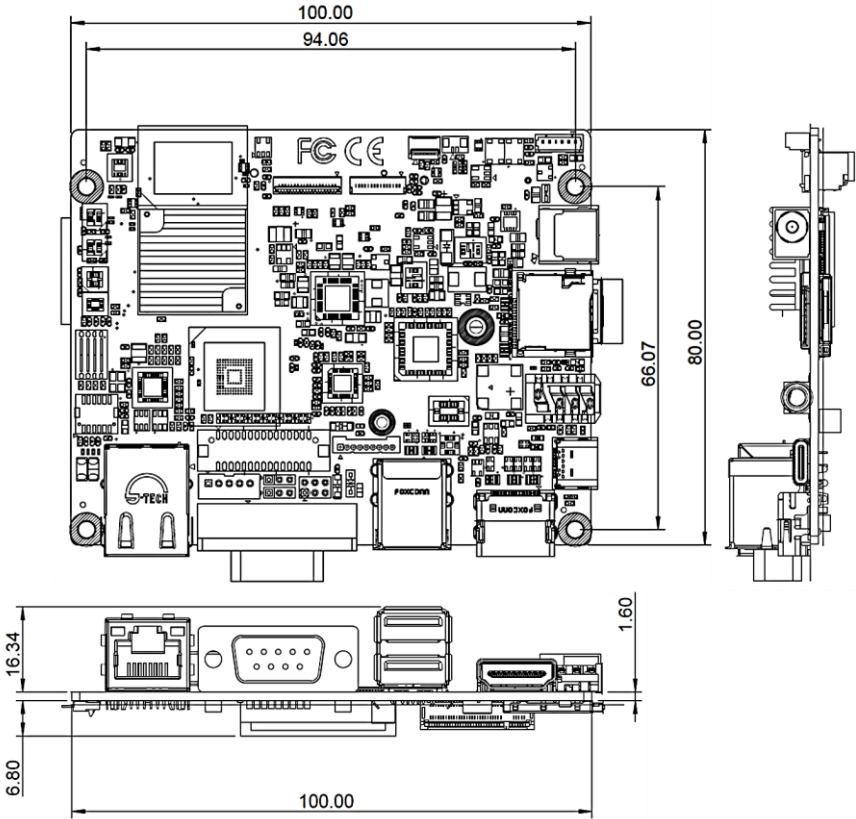
Solder Side
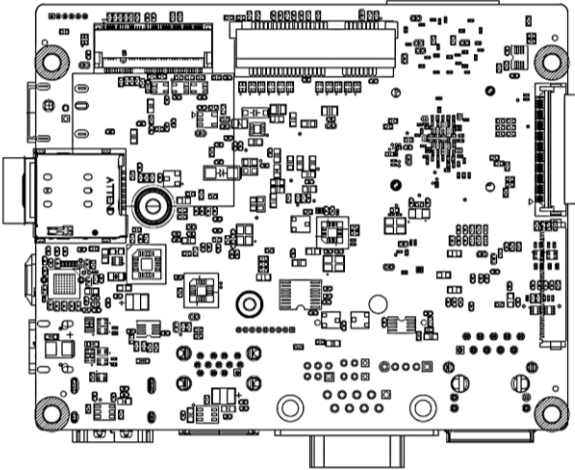
2.2   Jumpers and Connectors

Top
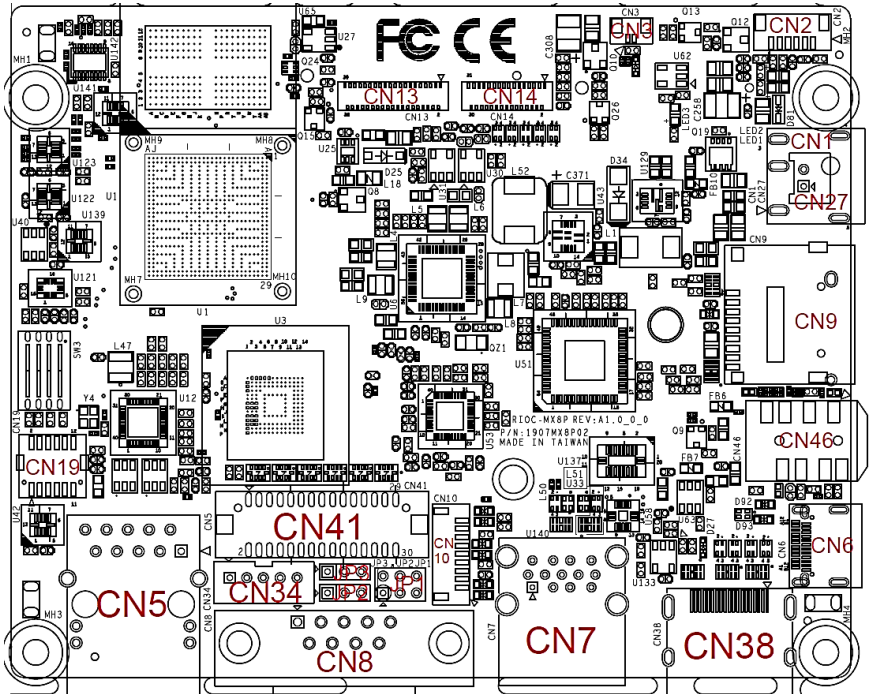
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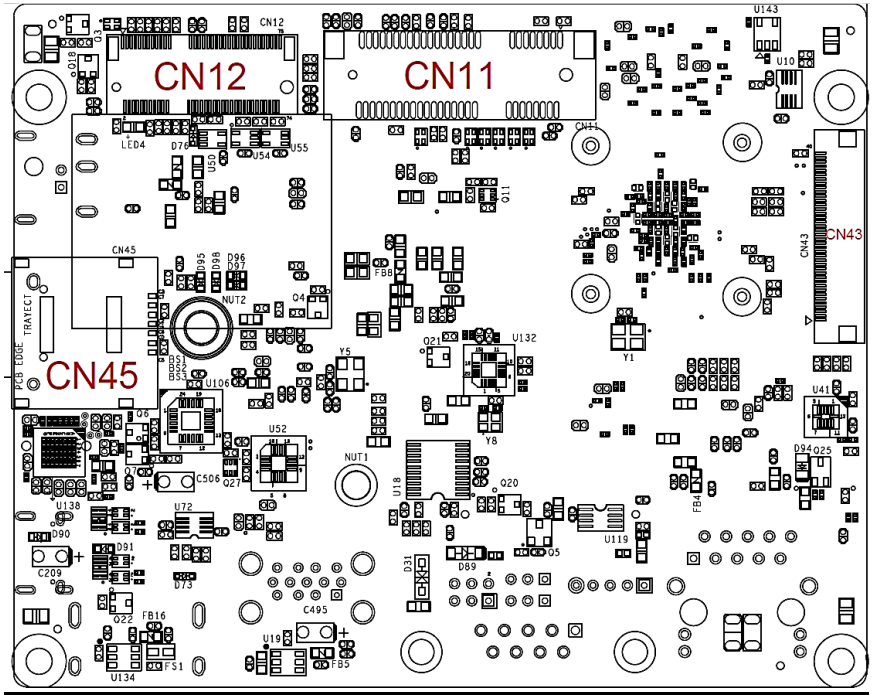
2.3   List of Jumpers

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

Label	Function
JP1	COM Pin9 Mode (Ring/+5V/+12V) Selection
JP2	LVDS Inverter/Backlight Voltage Selection
JP3	LVDS Operating Voltage Selection

2.3.1   COM Pin 9 Power Selection (JP1)

+5V   Ring (Default)   +12V
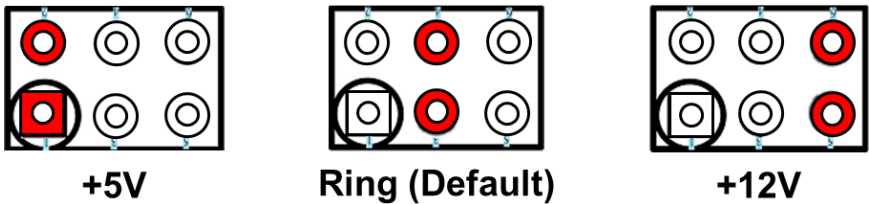
2.3.2   LVDS Backlight Power Selection (JP2)

+5V   +12V (Default)

2.3.3   LVDS Power Selection (JP3)

+3.3V (Default)   +5V

2.4   List of Connectors

Please refer to the table below for all of the board's connectors that you can configure for your application. For connector vendor and model information, please refer to Appendix A.

Label	Function
CN1	+12V DC Power Jack (Optional)
CN2	Power Button/Reset Button/Power LED
CN3	RTC Battery Connector
CN5	RJ-45 LAN Port 1
CN6	USB 3.2 Gen 1 Type C OTG
CN7	USB 3.2 Gen 1/USB 2.0 Port
CN8	COM Port
CN9	Micro SD Card
CN10	External 5V/RS-232/3.3V/Debug Port
CN11	Mini PCIe Connector for LTE/mSATA/PCIe 2.0
CN12	M.2 E-Key Slot
CN13	MIPI LCD Connector
CN14	MIPI CSI Camera Connector
CN19	DIO/Buzzer/5V
CN27	+12V External Power Input
CN34	LVDS Inverter/Backlight Connector
CN38	HDMI
CN41	LVDS LCD Connector
CN43	FPC Connector
CN45	Nano SIM Card Socket
CN46	Audio Jack w/Mic Function

2.4.1   DC Power Jack (Optional) (CN1)
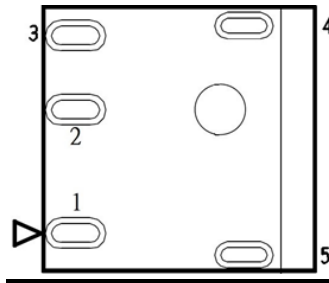
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	GND	GND	
3	DCIN	PWR	+12V
4	GND	GND	
5	GND	GND	

2.4.2   Power Button/Reset Button/Power LED (CN2)
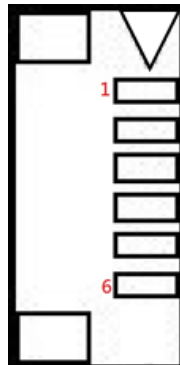
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	GND
2	ONOFF	IN	+1.8V
3	GND	GND	GND

Pin	Pin Name	Signal Type	Signal Level
4	RST_BTN	IN	
5	STATUS_LED	IN	+1.8V
6	VDD_3V3	PWR	+3.3V

2.4.3 RTC Battery Connector (CN3)
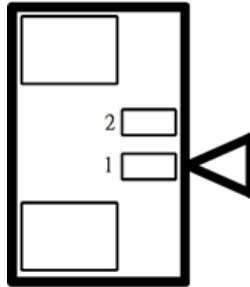
Pin	Pin Name	Signal Type	Signal Level
1	VRTC_BAT	PWR	+3.3V
2	GND	GND	GND

2.4.4 RJ-45 LAN Port 1 (CN5)
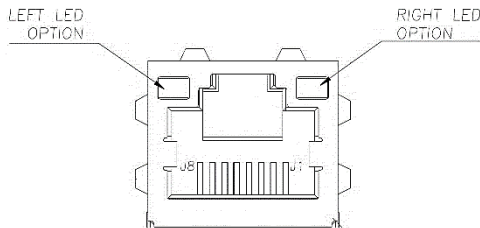
Pin	Pin Name	Signal Type	Signal Level
J1	MDI0+	DIFF	
J2	MDI0-	DIFF	
J3	MDI1+	DIFF	
J4	MDI1-	DIFF	

Pin	Pin Name	Signal Type	Signal Level
J5	MDI2+	DIFF	
J6	MDI2-	DIFF	
J7	MDI3+	DIFF	
J8	MDI3-	DIFF	

LED Color		Link Speed
LEFT	Right	
OFF	Orange	10 Mbps
OFF	Green	100 Mbps
Yellow	OFF	1000 Mbps

2.4.5   USB 3.2 Gen 1 Type C OTG (CN6)
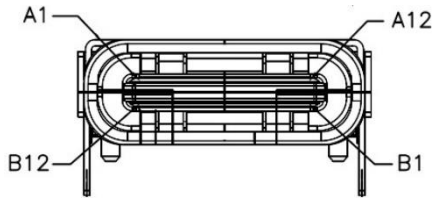
Pin	Pin Name	Signal Type	Signal Level
A1	GND	GND	GND
A2	SSTXP1	DIFF	
A3	SSTXN1	DIFF	
A4	VCC50_USB_C	PWR	+5V
A5	TYPEC_CC1	I/O	
A6	TYPEC_DP_C	DIFF	
A7	TYPEC_DN_C	DIFF	
A8	N.C.	N/A	N/A
A9	VCC50_USB_C	PWR	+5V
A10	SSRXN2	DIFF	
A11	SSRXP2	DIFF	
A12	GND	GND	GND

Pin	Pin Name	Signal Type	Signal Level
B1	GND	GND	GND
B2	SSTXP2	DIFF	
B3	SSTXN2	DIFF	
B4	VCC50_USB_C	PWR	+5V
B5	TYPEC_CC2	I/O	
B6	TYPEC_DP_C	DIFF	
B7	TYPEC_DN_C	DIFF	
B8	N.C.	N/A	N/A
B9	VCC50_USB_C	PWR	+5V
B10	SSRXN1	DIFF	
B11	SSRXP1	DIFF	
B12	GND	GND	GND

Note: The driving current of VBUS_TYPEC supports up to 2A.

2.4.6   USB 3.2 Gen 1/USB 2.0 Port (CN7)
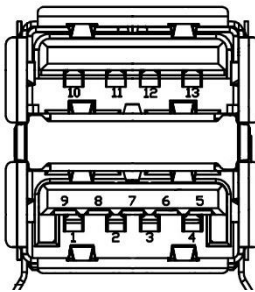
Pin	Pin Name	Signal Type	Signal Level
1	VCC5V0_TYPEA	PWR	+5V
2	HUB_USB3_DN_C	DIFF	
3	HUB_USB3_DP_C	DIFF	
4	GND	GND	GND
5	USB2_RXN_L	DIFF	
6	USB2_RXP_L	DIFF	

Pin	Pin Name	Signal Type	Signal Level
7	GND	GND	GND
8	USB2_TXN_L	DIFF	
9	USB2_TXP_L	DIFF	
10	VCC5V0_TYPEA	PWR	+5V
11	HUB_USB4_DN_C	DIFF	
12	HUB_USB4_DP_C	DIFF	
13	GND	GND	GND

Note: The driving current of 5V_USB_C supports up to 2A.

2.4.7   COM Port (CN8)

RS-232			
Pin	Pin Name	Signal Type	Signal Level
1	DCD	IN	
2	RXD	IN	
3	TXD	OUT	±10V
4	DTR	OUT	±10V
5	GND	GND	GND
6	DSR	IN	
7	RTS	OUT	±10V
8	CTS	IN	
9	RI/ +5V/ +12V	IN/ PWR	+5V/+12V

RS-485			
Pin	Pin Name	Signal Type	Signal Level
5	GND	GND	GND
1	RS485_D-	I/O	±5V
2	RS485_D+	I/O	±5V

RS-422			
Pin	Pin Name	Signal Type	Signal Level
5	GND	GND	GND
1	RS422_TX-	OUT	±5V
2	RS422_TX+	OUT	±5V
3	RS422_RX+	IN	
4	RS422_RX-	IN	

Note: COM RS-232/422/485 will be set by APP setting. Default is RS-232.

2.4.8 Micro SD Card (CN9)

Standard specifications.

2.4.9 External 5V/RS-232/3.3V/Debug Port (CN10)
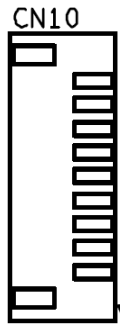
Pin	Pin Name	Signal Type	Signal Level
1	RS232_RX_3	I/O	+3.3V
2	RS232_TX_3	I/O	+3.3V
3	GND	GND	GND
4	5V_SYS	PWR	+5V
5	UART4_TXD_3V3	I/O	+3.3V
6	UART4_RXD_3V3	I/O	+3.3V

Pin	Pin Name	Signal Type	Signal Level
7	UART2_RX_DBG	I/O	+3.3V
8	UART2_TX_DBG	I/O	+3.3V
9	3V3_SYS	PWR	+3.3V

2.4.10   Mini PCIe Connector (CN11)
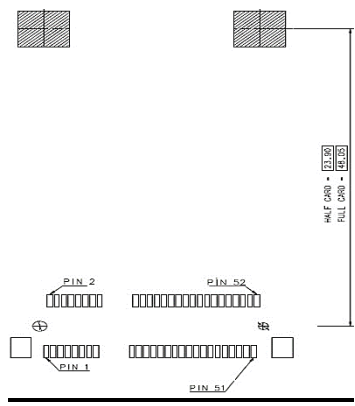
Pin	Pin Name	Signal Type	Signal Level
1	VPCIE_3V3	PWR	+3.3V
2	VPCIE_3V3	PWR	+3.3V
3	N.C.	N/A	N/A
4	GND	GND	GND
5	N.C.	N/A	N/A
6	N.C.	N/A	N/A
7	VPCIE_3V3	PWR	+3.3V
8	USIM_PWR		
9	GND	GND	GND
10	USIM_DATA		
11	N.C.	N/A	N/A
12	USIM_CLK		
13	N.C.	N/A	N/A
14	USIM_RESET		

Pin	Pin Name	Signal Type	Signal Level
15	GND	GND	GND
16	N.C.	N/A	N/A
17	N.C.	N/A	N/A
18	GND	GND	GND
19	N.C.	N/A	N/A
20	PCIE_W_OFF		
21	GND	GND	GND
22	PCIE_RST		
23	N.C.	N/A	N/A
24	VPCIE_3V3	PWR	+3.3V
25	N.C.	N/A	N/A
26	GND	GND	GND
27	GND	GND	GND
28	N.C.	N/A	N/A
29	GND	GND	GND
30	PCIE_SCL_3V3	I/O	+3.3V
31	N.C.	N/A	N/A
32	PCIE_SDA_3V3	I/O	+3.3V
33	N.C.	N/A	N/A
34	GND	GND	GND
35	GND	GND	GND
36	MINIPCIE_DN	DIFF	
37	GND	GND	GND
38	MINIPCIE_DP	DIFF	
39	VPCIE_3V3	PWR	+3.3V
40	GND	GND	GND
41	VPCIE_3V3	PWR	+3.3V
42	N.C.	N/A	N/A
43	GND	GND	GND
44	N.C.	N/A	N/A
45	N.C.	N/A	N/A
46	N.C.	N/A	N/A
47	N.C.	N/A	N/A

Pin	Pin Name	Signal Type	Signal Level
48	N.C.	N/A	N/A
49	N.C.	N/A	N/A
50	GND	GND	GND
51	N.C.	N/A	N/A
52	VPCIE_3V3	PWR	+3.3V

2.4.11   M.2 E-Key Slot (CN12)

Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	GND
2	VM2_3V3	PWR	+3.3V
3	M2_USB_DP	DIFF	
4	VM2_3V3	PWR	+3.3V
5	M2_USB_DN	DIFF	
6	M.2_LED	OUT	
7	GND	GND	GND
8	M2_PCM_CLK	I/O	+1.8V
9	M2_SD_CLK	IN	+1.8V
10	M2_PCM_SYNC	I/O	+1.8V
11	M2_SD_CMD	I/O	+1.8V
12	M2_PCM_IN	IN	+1.8V
13	M2_SD_DAT0	I/O	+1.8V
14	M2_PCM_OUT	OUT	+1.8V
15	M2_SD_DAT1	I/O	+1.8V
16	M.2_LED2	OUT	
17	M2_SD_DAT2	I/O	+1.8V
18	GND	GND	GND
19	M2_SD_DAT3	I/O	+1.8V
20	BT_WAKE	OUT	+3.3V
21	WL_WAKE_HOST	OUT	+1.8V
22	UART1_RXD	IN	+1.8V
23	M2_SD_Nrst	IN	+1.8V
32	UART1_TXD	OUT	+1.8V

Pin	Pin Name	Signal Type	Signal Level
33	GND	GND	GND
34	UART1_CTS	IN	+1.8V
35	PCIE_PET_P0	DIFF	
36	UART1_RTS	OUT	+1.8V
37	PCIE_PET_N0	DIFF	
38	N.C.	N/A	N/A
39	GND	GND	GND
40	N.C.	N/A	N/A
41	PCIE_RXP	DIFF	
42	N.C.	N/A	N/A
43	PCIE_RXN	DIFF	
44	N.C.	N/A	N/A
45	GND	GND	GND
46	N.C.	N/A	N/A
47	REF_CLKP_CN	DIFF	
48	N.C.	N/A	N/A
49	REF_CLKN_CN	DIFF	
50	REF_CLK_32K_3V3	IN	+3.3V
51	GND	GND	GND
52	PCIe_nRST_3V3	IN	+3.3V
53	PCIE_nCLKREQ_3V3	I/O	+3.3V
54	TP132	Test_Point	
55	PCIe_nWAKE_3V3	I/O	+3.3V
56	W_DISABLE1	IN	+3.3V
57	GND	GND	GND
58	I2C2_SDA_M2	I/O	+1.8V
59	N.C.	N/A	N/A
60	I2C2_SCL_M2	IN	+1.8V
61	N.C.	N/A	N/A
62	N.C.	N/A	N/A
63	GND	GND	GND
64	N.C.	N/A	N/A
65	N.C.	N/A	N/A

Pin	Pin Name	Signal Type	Signal Level
66	N.C.	N/A	N/A
67	N.C.	N/A	N/A
68	N.C.	N/A	N/A
69	GND	GND	GND
70	N.C.	N/A	N/A
71	N.C.	N/A	N/A
72	VM2_3V3	PWR	+3.3V
73	N.C.	N/A	N/A
74	VM2_3V3	PWR	+3.3V
75	GND	GND	GND

2.4.12   MIPI LCD Connector (CN13)
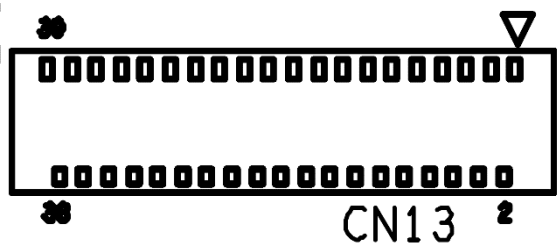
Pin	Pin Name	Signal Type	Signal Level
1	VCC2V8_TOUCH_C	PWR	+2.8V
2	GND	GND	
3	TOUCH_RST_L	OUT	+1.8V
4	I2C2_SCL	I/O	+1.8V
5	I2C2_SDA	I/O	+1.8V
6	DSI_TS_nINT	IN	+1.8V
7	N.C.	N/A	N/A
8	LED+	PWR	
9	LED+	PWR	
10	N.C.	N/A	N/A
11	LED-	PWR	

Pin	Pin Name	Signal Type	Signal Level
12	LED-	PWR	
13	LED-	PWR	
14	N.C.	N/A	N/A
15	GND	GND	
16	GND	GND	
17	LCD_ID	IN	
18	GND	GND	
19	DSI_D3P	DIFF	
20	DSI_D3N	DIFF	
21	GND	GND	
22	DSI_D2P	DIFF	
23	DSI_D2N	DIFF	
24	GND	GND	
25	DSI_CLKP	DIFF	
26	DSI_CLKN	DIFF	
27	GND	GND	
28	DSI_D1P	DIFF	
29	DSI_D1N	DIFF	
30	GND	GND	
31	DSI_D0P	DIFF	
32	DSI_D0N	DIFF	
33	GND	GND	
34	GND	GND	
35	LCD_RST_N	OUT	+1.8V
36	VDD_1V8	PWR	+1.8V
37	VDD_3V3	PWR	+3.3V
38	VDD_3V3	PWR	+3.3V
39	LCD_FMARK	OUT	

2.4.13   MIPI CSI Camera Connector (CN14)

Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	GND
2	CSI_nRST	OUT	+1.8V
3	N.C.	N/A	
4	I2C3_SDA	I/O	+1.8V
5	I2C3_SCL	I/O	+1.8V
6	GND	GND	GND
7	CSI_MCLK	OUT	+1.8V
8	GND	GND	GND
9	CSI_D0N	DIFF	
10	CSI_D0P	DIFF	
11	GND	GND	GND
12	CSI_D1N	DIFF	
13	CSI_D1P	DIFF	
14	GND	GND	GND
15	CSI_CLKN	DIFF	
16	CSI_CLKP	DIFF	
17	GND	GND	GND
18	CSI_D2N	DIFF	
19	CSI_D2P	DIFF	
20	GND	GND	GND
21	CSI_D3N	DIFF	
22	CSI_D3P	DIFF	
23	GND	GND	GND
24	VCC2V8_DVP	PWR	2.8V
25	GND	GND	GND
26	VCC1V2_DVP	PWR	1.2V
27	VDD_1V8	PWR	1.8V
28	GND	GND	GND
29	VCM_VDD_2V8	PWR	2.8V
30	VCM_VDD_2V8	PWR	2.8V
31	GND	GND	GND

2.4.14   DIO/Buzzer/5V (CN19)
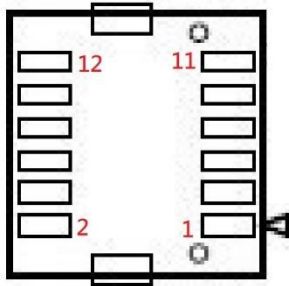
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	GND
2	VSYS_5V	PWR	+5V
3	GPIOB1	I/O	+5V(Default) +3.3V(Option)
4	GPIOA1	I/O	
5	GPIOB2	I/O	
6	GPIOA2	I/O	
7	GPIOB3	I/O	
8	GPIOA3	I/O	
9	GPIOB4	I/O	
10	GPIOA4	I/O	
11	Bz+		For 5V Buzzer
12	Bz-		

Note: CN19 must be used with APP "RICO-MX8P_GPIO_COMSelect.

2.4.15   +12V External Power Input (CN27)
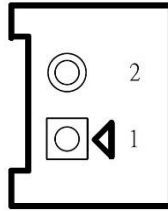
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	DCIN	PWR	+12V

Note: CN1 and CN27 cannot be used at the same time.

2.4.16   LVDS Inverter/Backlight Connector (CN34)
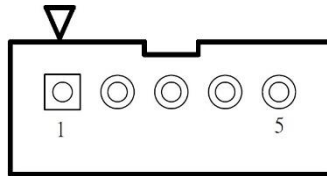
Pin	Pin Name	Signal Type	Signal Level
1	DIS_PWR	PWR	+5V / +12V(Default)
2	BKLCTL	OUT	+3.3V(Default) / +5V
3	GND	GND	
4	GND	GND	
5	ENABLK	OUT	+3.3V(Default) / +5V

Note: DIS_PWR can be set to +12V or +5V by JP2.

Note: BKLCTL can be set by JP3.

**Note**: The driving current of DIS_PWR supports up to 2A.

2.4.17   HDMI (CN38)
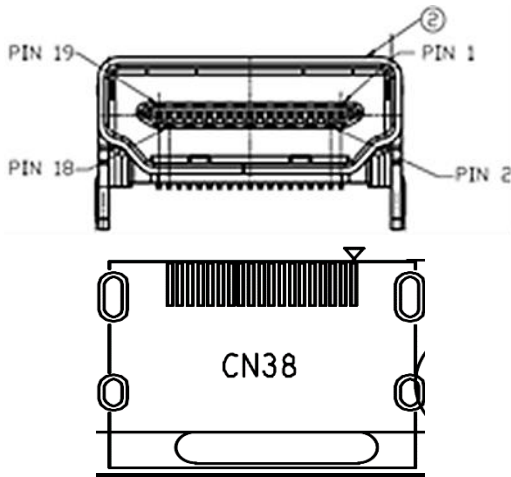
Pin	Pin Name	Signal Type	Signal Level
1	HDMI_TX2P_CONN	DIFF	
2	GND	GND	GND
3	HDMI_TX2N_CONN	DIFF	
4	HDMI_TX1P_CONN	DIFF	
5	GND	GND	GND
6	HDMI_TX1N_CONN	DIFF	
7	HDMI_TX0P_CONN	DIFF	
8	GND	GND	GND
9	HDMI_TX0N_CONN	DIFF	
10	HDMI_TXCP_CONN	DIFF	
11	GND	GND	GND
12	HDMI_TXCN_CONN	DIFF	
13	PORT_CEC	OUT	+3.3V
14	N.C.	N/A	N/A
15	DDC_SCL	I/O	+5V
16	DDC_SDA	I/O	+5V
17	GND	GND	GND

Pin	Pin Name	Signal Type	Signal Level
18	VCC50_HDMI	PWR	+5V
19	HDMI_HPD_CONN	IN	

2.4.18   LVDS LCD Connector (CN4)
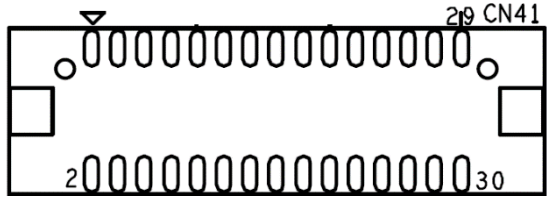
Pin	Pin Name	Signal Type	Signal Level
1	ENABLK	OUT	+3.3V(Default) /+5V
2	BKLCTL	OUT	+3.3V(Default) /+5V
3	VCC_LVDS	PWR	+3.3V(Default) /+5V
4	GND	GND	
5	LVDS_CLK0N_C	DIFF	
6	LVDS_CLK0P_C	DIFF	
7	VCC_LVDS	PWR	+3.3V(Default) /+5V
8	GND	GND	
9	LVDS_D0N_C	DIFF	
10	LVDS_D0P_C	DIFF	
11	LVDS_D1N_C	DIFF	
12	LVDS_D1P_C	DIFF	
13	LVDS_D2N_C	DIFF	
14	LVDS_D2P_C	DIFF	
15	LVDS_D3N_C	DIFF	
16	LVDS_D3P_C	DIFF	
17	DDC_DATA	I/O	+3.3V
18	DDC_CLK	I/O	+3.3V
19	LVDS_D5N_C	DIFF	
20	LVDS_D5P_C	DIFF	

Pin	Pin Name	Signal Type	Signal Level
21	LVDS_D6N_C	DIFF	
22	LVDS_D6P_C	DIFF	
23	LVDS_D7N_C	DIFF	
24	LVDS_D7P_C	DIFF	
25	LVDS_D8N_C	DIFF	
26	LVDS_D8P_C	DIFF	
27	VCC_LVDS	PWR	+3.3V(Default) /+5V
28	GND	GND	
29	LVDS_CLK1N_C	DIFF	
30	LVDS_CLK1P_C	DIFF	

2.4.19   FPC Connector (CN46)
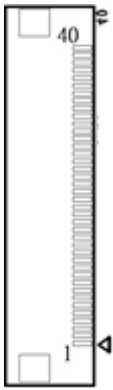
Pin	Pin Name	Signal Type	Signal Level
1	ENET1_RD0	IN	+1.8V
2	ENET1_RD1	IN	+1.8V
3	ENET1_RD2	IN	+1.8V
4	ENET1_RD3	IN	+1.8V
5	ENET1_RX_CTL	IN	+1.8V
6	ENET1_RXC	IN	+1.8V
7	ENET1_MDC	OUT	+1.8V
8	ENET1_MDIO	I/O	+1.8V

Pin	Pin Name	Signal Type	Signal Level
9	GND	GND	GND
10	PHY1_TXD0	OUT	+1.8V
11	PHY1_TXD1	OUT	+1.8V
12	PHY1_TXD2	OUT	+1.8V
13	PHY1_TXD3	OUT	+1.8V
14	PHY1_TXEN	OUT	+1.8V
15	PHY1_TXCLK	OUT	+1.8V
16	MAC1_nRST	OUT	+3.3V
17	MAC1_nINT	IN	+3.3V
18	GND	GND	GND
19	HUB_USB6_DP	I/O	+3.3V
20	HUB_USB6_DN	I/O	+3.3V
21	GND	GND	GND
22	HUB_USB7_DP	I/O	+3.3V
23	HUB_USB7_DN	I/O	+3.3V
24	GND	GND	GND
25	CAN1_STBY_3V3	OUT	+3.3V
26	CAN1_TX	OUT	+3.3V
27	CAN1_RX	IN	+3.3V
28	CAN2_STBY_3V3	OUT	+3.3V
29	CAN2_TX	OUT	+3.3V
30	CAN2_RX	IN	+3.3V
31	N.C.	N/A	N/A
32	DB_PG_Q	Test_Point	
33	BAT_OFF		
34	GND	GND	GND
35	I2C3_SDA	I/O	+3.3V
36	I2C3_SCL	I/O	+3.3V
37	TP34	Test_Point	
38	TP35	Test_Point	
39	HUB_OC6-7#	IN	
40	DAU_3V3_EN	OUT	+3.3V

2.4.20   Nano SIM Card Socket (CN45)
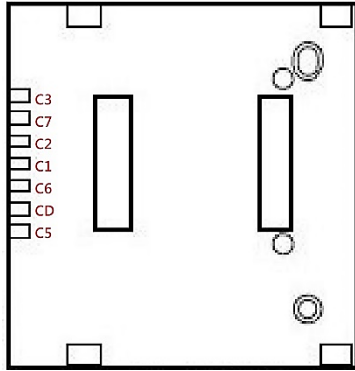
Pin	Pin Name	Signal Type	Signal Level
C3	USIM_CLK	IN	
C7	USIM_DATA	I/O	
C2	USIM_RESET	IN	
C1	USIM_PWR	PWR	
C6	N.C.	N/A	
CD	Card Detect	IN	
C5	GND	GND	GND

Note: CN45 must be used with the Nano SIM Card tray (P/N: P2M0410010).

2.4.21   Audio Jack w/Mic Function (CN46)
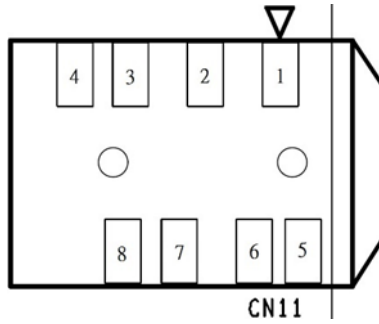
Pin	Pin Name	Signal Type	Signal Level
1	HP_J_MIC	IN	
2	GND	GND	
3	HP_J_R	OUT	
4	N.C.	N/A	N/A
5	HP_J_D	IN	
6	N.C.	N/A	N/A
7	N.C.	N/A	N/A
8	HP_J_L	OUT	

Chapter 3

MAC Address

3.1   MAC Address Writing

As the MAC ID can only be programmed into the CPU once and cannot be altered thereafter, it is advisable to configure it within the operating system. This approach ensures that any potential errors can be corrected without permanently affecting the CPU.

Step 1: Power off the laptop. Connect to the CN10 debug port and set the SW3 switch to the 0010 configuration.
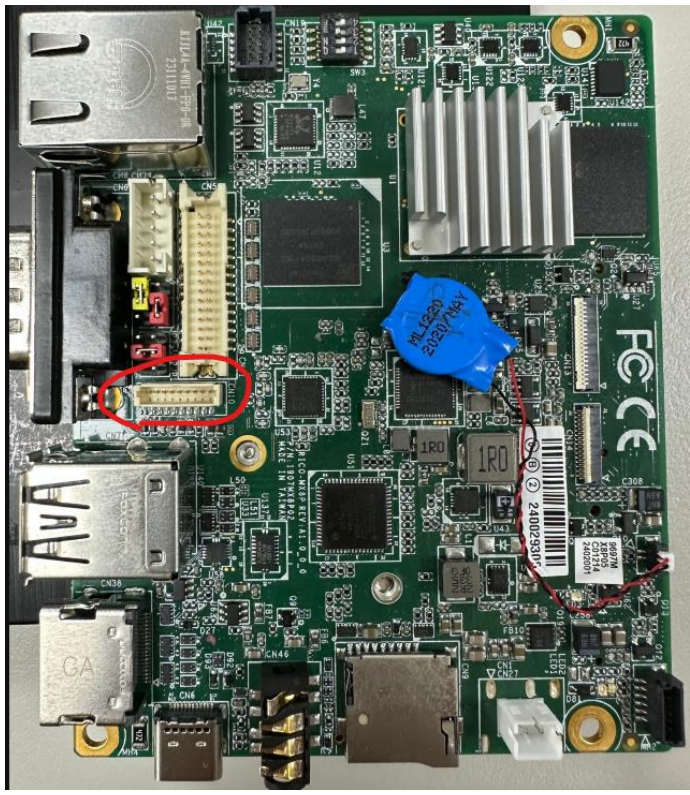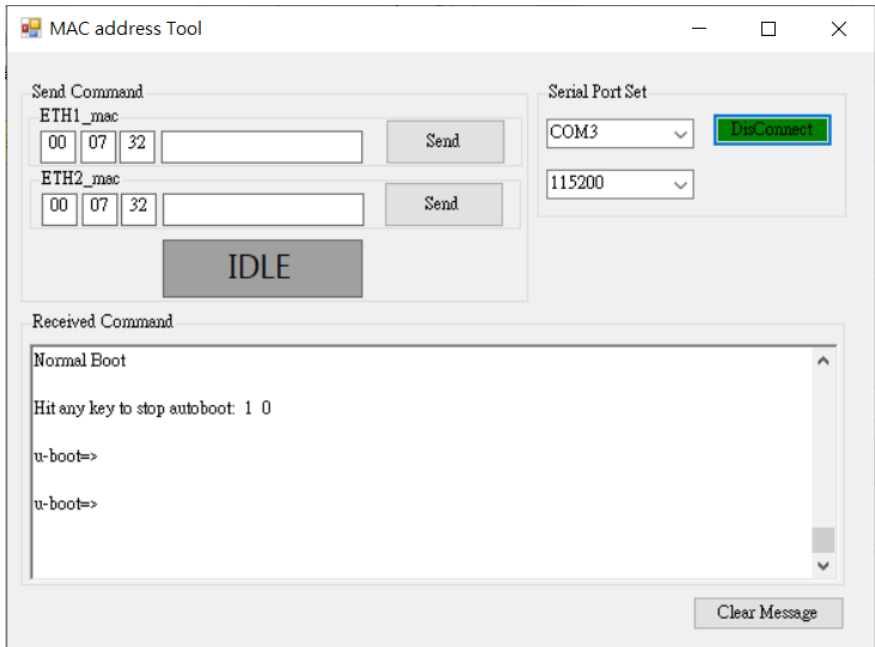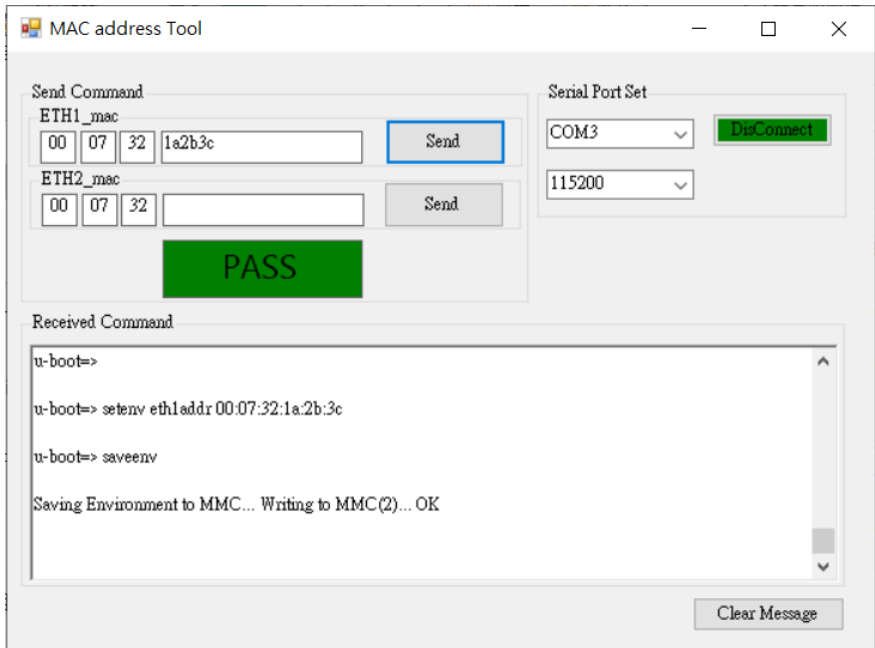
Step 2: Open **MacaddressTool.exe**.

Step 3: Select the appropriate COM port and click 'Connect.' Then, power on the device by connecting the power source.
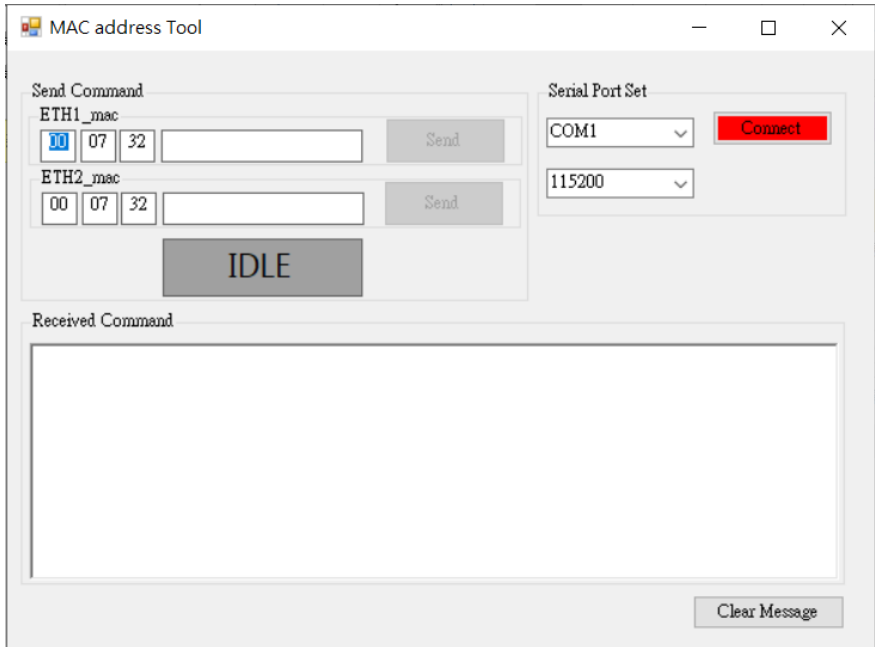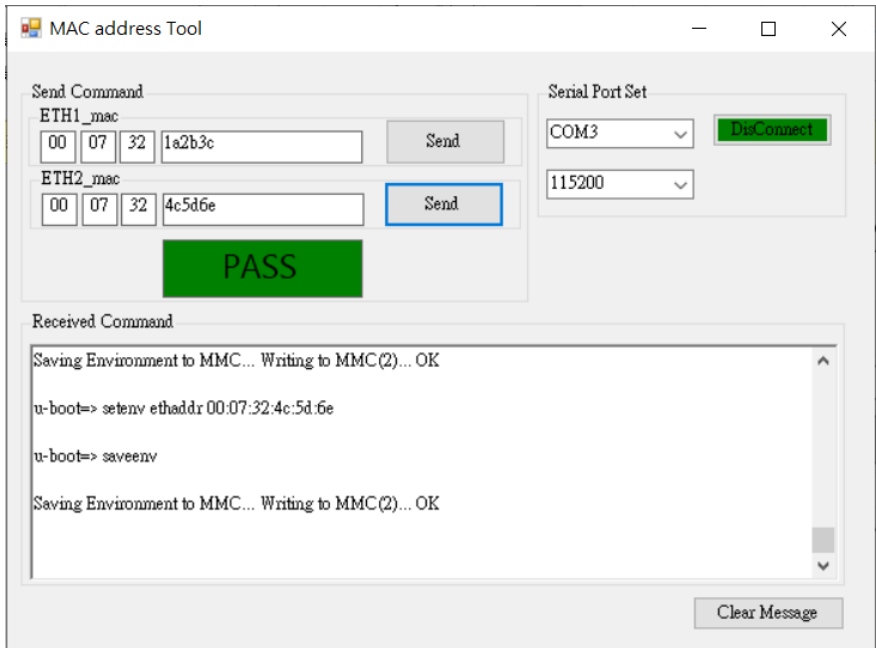
Step 4: Enter the MAC address: use ETH1 for the mainboard and ETH2 for the

PER-T650.

Step 5: Click 'Send.' The button will display 'PASS' if the write is successful

You can write another MX8P without disconnecting the serial port.

You can also verify the MAC address in the system using the ifconfig command. For the mainboard, check eth1, and for the PER-T650, check eth0.

Appendix A

Mating Connectors

A.1 List of Mating Connectors and Cables

Onboard Connector				
Label	Function	Vendor	Model No	P/N
CN1	DC Power Jack +12V Input (Optional)	SWITCHTECH	DC-044A-2.5	16525X0001
CN2	Power Button/Reset Button/Power LED	Aces	50228-00671-001	16535X0008
CN3	RTC Battery Connector	ACES	50207-00271-001	1655902025
CN5	LAN Port 1 (RJ45) Connector	SPEED TECH	RJJL4A-4WH1-FP0-0R	1652814205
CN6	USB 3.2 Gen 1 Type C OTG	AMCO TEC	211-202401-105	16548X0017
CN7	USB 3.2 Gen 1/USB2.0 Port	FOXCONN	UEA1112C-UHS6-4F	1654801330
CN8	COM Port	ASTRON	DB6A-09-AMAN1T-R	1654400914
CN9	Micro SD Card Socket	TRONTEK	KSIF09R11292	16549X0087
CN10	External 5V/RS232/3.3V/Debug Port	PINREX	710-73-09TWEG	1655X00035
CN11	Mini PCIe connector for LTE/mSATA/PCI-E 2.0	FOXCONN	AS0B226-S68Q-7H	1654226303
CN12	M.2 E Key Slot (For WiFi)	FOXCONN	AS0BC21-S67BE-LH	1654207539
CN13	MIPI LCD Connector	Panasonic	AYF333935	1654903931
CN14	Camera Connector MIPI CSI	Panasonic	AYF333135	1654903130
CN19	GPIO / Buzzer / 5V	Aces	50238-01241-001	16535X0015
CN27	External Power +12V Input	CATCH	1192-700-04S	1655302020
CN34	LVDS Inverter/ Backlight Connector	PINREX	721-81-05TW00	1655305025
CN38	HDMI Connector	FOXCONN	QJ51191-LFB4-7F	1654401932
CN41	LVDS LCD Connector	SHENG DA	9812WVS-2156TV01BN	1654003004
CN43	FPC Connector for Dual USB2.0 Port / LAN Port 2 / 3.3V I2C / CANBUS	Sunfun	FBX520Z-40(21R)	1654904034
CN45	Nano SIM Card Socket	Attend	115U-A101	16549X0021
CN46	Audio Combo Jack	Astron	E35S16AA-8S-R	1652708203

Mating Connector			
Label	Function	Vendor	Model No
CN1	DC Power Jack +12V Input (Optional)	N/A	N/A
CN2	Power Button/Reset Button/Power LED	SHR	WL1010H-6P 1.0PITCH
CN3	RTC Battery Connector	JST	SUR 0.8 2P
CN5	LAN Port 1 (RJ45) Connector	N/A	N/A
CN6	USB 3.2 Gen 1 Type C OTG	N/A	N/A
CN7	USB 3.2 Gen 1/USB2.0 Port	N/A	N/A
CN8	COM Port	N/A	N/A
CN9	Micro SD Card Socket	N/A	N/A
CN10	External 5V/RS232/3.3V/Debug Port	JCTC	11002H00-9P
CN11	Mini PCIe connector for LTE/mSATA/PCI-E 2.0	N/A	N/A
CN12	M.2 E Key Slot (For WiFi)	N/A	N/A
CN13	MIPI LCD Connector	N/A	N/A
CN14	Camera Connector MIPI CSI	N/A	N/A
CN19	GPIO / Buzzer / 5V	JCTC	11002H00-2*6P
CN27	External Power +12V Input	JST	PHR-2
CN34	LVDS Inverter/ Backlight Connector	JST	PHR-5
CN38	HDMI Connector	N/A	N/A
CN41	LVDS LCD Connector	HRS	DF13-30DS-1.25PITCH
CN43	FPC Connector for Dual USB2.0 Port / LAN Port 2 / 3.3V I2C / CANBUS	N/A	N/A
CN45	Nano SIM Card Socket	N/A	N/A
CN46	Audio Combo Jack	N/A	N/A

Label	Available Cable	Cable P/N
CN1	N/A	N/A
CN2	N/A	N/A
CN3	RTC Cable with Battery	1750X00007
CN5	N/A	N/A
CN6	N/A	N/A
CN7	N/A	N/A
CN8	N/A	N/A
CN9	N/A	N/A
CN10	Combo cable with DB9 and Dupont wire connector	170X000696
CN11	N/A	N/A
CN12	N/A	N/A
CN13	N/A	N/A
CN14	N/A	N/A
CN19	Combo cable with LED and Buzzer	170X000705
CN27	Power Cable	170302015C
CN34	LVDS B/L Cable	170X000707
CN38	N/A	N/A
CN41	LVDS Cable	170X000707
CN43	Daughter Board Cable	170X000541
CN45	Nano SIM Card Tray	P2M0410010
CN46	N/A	N/A