SRG-CM4

Standard Gateway System

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
● SRG-CM4	1
● 2-pin 3.81mm Power Terminal block w/lock AWG 28~14	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 -40° C (-40°F) OR ABOVE 80°C (176°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 System   QO4-381 Rev.A0

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	×	○	○	○	○	○
外壳	○	○	○	○	○	○
中央处理器 与内存	×	○	○	○	○	○
硬盘	×	○	○	○	○	○
液晶模块	×	×	○	○	○	○
光驱	×	○	○	○	○	○
触控模块	×	○	○	○	○	○
电源	×	○	○	○	○	○
电池	×	○	○	○	○	○

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。

备注：

一、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。

二、上述部件物质中央处理器、内存、硬盘、光驱、电源为选购品。

三、上述部件物质液晶模块、触控模块仅一体机产品适用。

China RoHS Requirement (EN)

Hazardous and Toxic Materials List

AAEON System   QO4-381 Rev.A0

Component Name	Hazardous or Toxic Materials or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBBs)	Polybrominated diphenyl ethers (PBDEs)
PCB and Components	X	O	O	O	O	O
Wires & Connectors for Ext.Connections	X	O	O	O	O	O
Chassis	O	O	O	O	O	O
CPU & RAM	X	O	O	O	O	O
HDD Drive	X	O	O	O	O	O
LCD Module	X	X	O	O	O	O
Optical Drive	X	O	O	O	O	O
Touch Control Module	X	O	O	O	O	O
PSU	X	O	O	O	O	O
Battery	X	O	O	O	O	O

This form is prepared in compliance with the provisions of SJ/T 11364.

O: The level of toxic or hazardous materials present in this component and its parts is below the limit specified by GB/T 26572.

X: The level of toxic of hazardous materials present in the component exceed the limits specified by GB/T 26572, but is still in compliance with EU Directive 2011/65/EU (RoHS 2).

Notes:

1.   The Environment Friendly Use Period indicated by labelling on this product is applicable only to use under normal conditions.

2.   Individual components including the CPU, RAM/memory, HDD, optical drive, and PSU are optional.

3.   LCD Module and Touch Control Module only applies to certain products which feature these components.

Table of Contents

Chapter 1

Product Specifications

1.1 Specifications

System	
Processor	Broadcom BCM2711 Quad-Core Cortex-A72 (Arm v8) 64-bit SoC @1.5 GHz
Memory Type	Onboard LPDDR4, up to 8GB
Power Requirement	DC 9V ~36V, 2-pin 3.81mm Pitch Phoenix Connector
Dimensions	4.11" x 4.13" x 1.61" (104.4mm x 105mm x 41mm)
Weight	1.08 lb. (0.49Kg)
Operating Temperature	-4°F ~ 158°F (-20°C ~ 70°C)
Storage Temperature	-40°F ~ 176°F (-40°C ~ 80°C)
Operating Humidity	10% ~ 90% relative humidity, non-condensing
Certification	CE/FCC Class A

LED	
LED	Programmable LED Control x 3

Display	
Video Output	HDMI 1.4, up to 4K @30Hz (For SD card storage, up to 1080P)

I/O	
Ethernet	RJ-45 Gigabit Ethernet x 2
Audio	N/A
USB Port	USB 2.0 x 2 (Rear I/O) USB 2.0 OTG x 1 (Rear I/O) USB 2.0 x 1 (Pin Header, optional w/ CAN)
Debug Port	UART x 1 (Internal Wafer Box)

I/O

Serial Port	RS-232/422/485 Switchable x 2 (By Jumper)
	RS-485 with Isolation x 1 (Optional)
Storage	eMMC 5.1, 8GB/16GB/32GB (Optional)
	Micro SD Card x 1 (Optional w/o eMMC)
Expansion	Full-size Mini Card x 1 (USB Signal)
Other	DI x 2/DO x 2 with Isolation (Optional)
	Software Button x 1
	Power Button x 1
	Reset Button x 1
TPM	TPM 2.0 (Optional)
CANBus	CAN 2.0 A/B x 2 (Default, optional w/USB)

Accessories

Mounting Options	Wall Mount
	DIN Rail (Optional)

OS

OS	Raspberry Pi OS Desktop
	Debian 11

1.2   Block Diagram
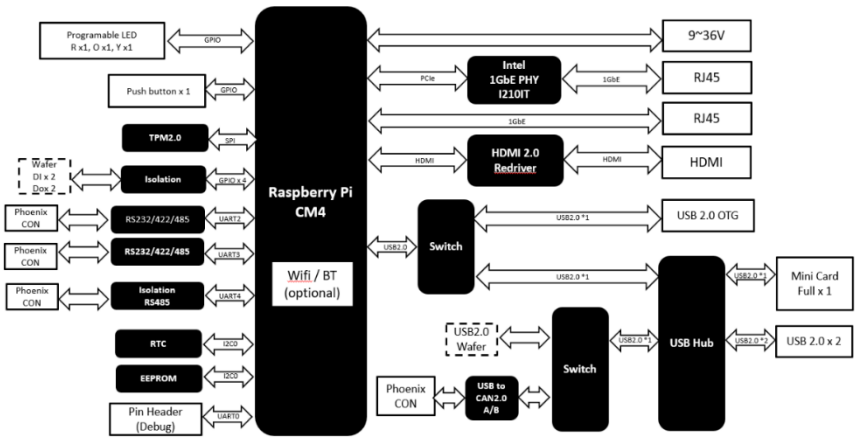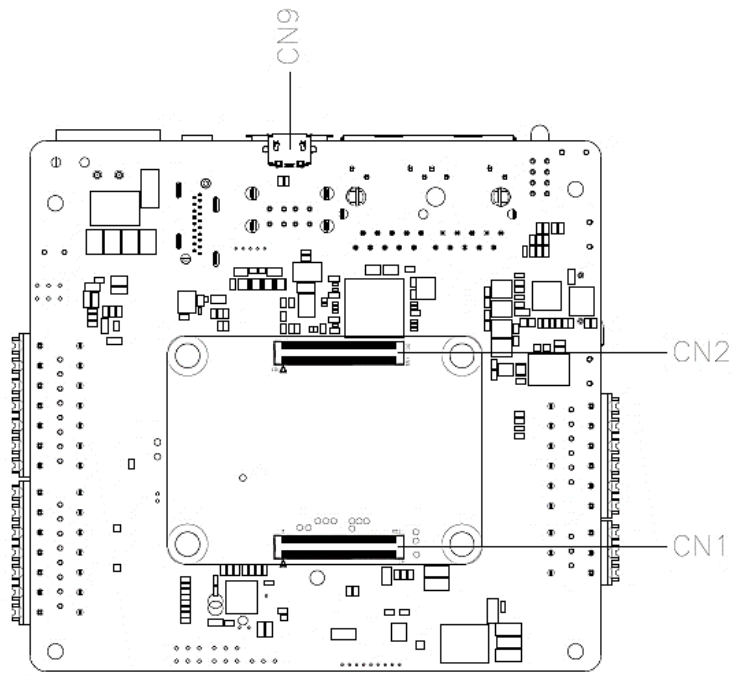
Chapter 2

Hardware Information

2.1 Dimensions

2.2   Jumpers and Connectors

**Component Side**
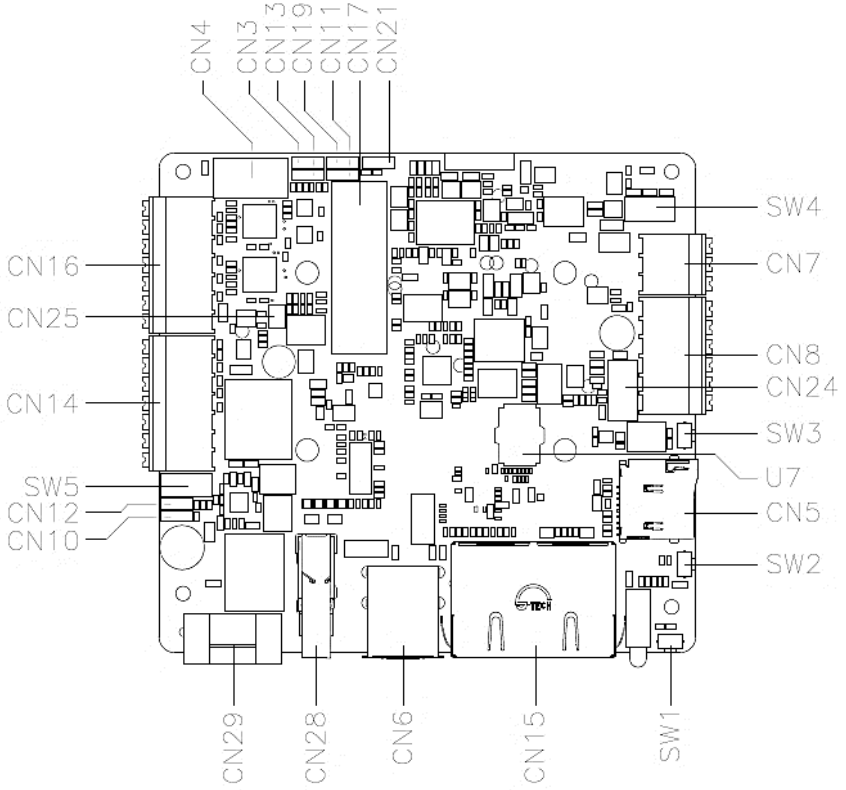
Solder Side

2.3　List of Jumpers & Switches

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

Label	Function
CN3	Force RPIBOOT (Reserved no test)
CN4	System Type Setting (Reserved flash image use)
CN10	COM 1 Mode Selection 0
CN11	COM 2 Mode Selection 0
CN12	COM 1 Mode Selection 1
CN13	COM 2 Mode Selection 1
CN19	COM 1 Mode Selection 2
CN21	COM 2 Mode Selection 2
SW1	Power Button (into lowest power mode)
SW2	Booting from an RPI server Button (Reserved no test)
SW3	Push Button (Reserved no test)
SW4	COM 3 Pull Up or Down Switch
SW5	COM 1 & 2 TX/RX Short Switch

2.3.1 Force RPIBOOT (CN3)
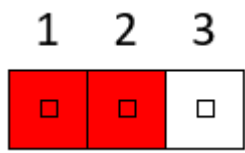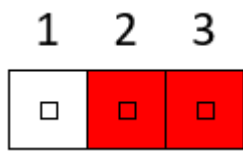
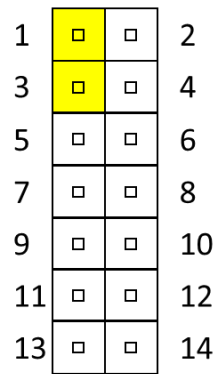Force   None

2.3.2 System Type Setting (CN4)
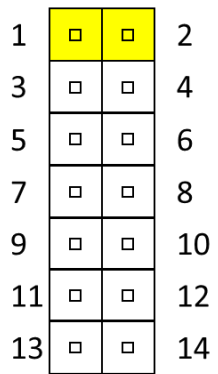
OS Burning Mode   Normal Mode

2.3.3   COM 1 Mode Selection (CN10/CN12/CN19)

CN10	1 2 3	1 2 3	1 2 3	1 2 3
CN12	1 2 3	1 2 3	1 2 3	1 2 3
CN19	1 2 3	1 2 3	1 2 3	1 2 3
	RS-232	RS-422	RS-485 (Driver)	RS-485 (Receiver)

2.3.4 COM 2 Mode Selection (CN11/CN13/CN21)

CN11	1 2 3	1 2 3	1 2 3	1 2 3
CN13	1 2 3	1 2 3	1 2 3	1 2 3
CN21	1 2 3	1 2 3	1 2 3	1 2 3
	RS-232	RS-422	RS-485 (Driver)	RS-485 (Receiver)

2.3.5 Power Button (SW1)

ON	PWRBTN#
OFF	Normal mode

2.3.6 Reset Button (SW2)

ON	Booting from an RPI server
OFF	Booting from an eMMC

2.3.7 Push Button (SW3)

ON	System custom functions
OFF	System custom functions

2.3.8   COM 3 Pull Up or Down Switch (SW4)

1-ON	RS485_A_UP
1-OFF	RS485_A_DOWN
2-ON	RS485_B_UP
2-OFF	RS485_B_DOWN

2.3.9   COM 1 & 2 TX/RX Short Switch (SW5)

1-ON	COM1 TX/RX short
1-OFF	COM1 Normal mode
2-ON	COM2 TX/RX short
2-OFF	COM2 Normal mode

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

Label	Function
CN1	CM4 B2B Connector A
CN2	CM4 B2B Connector B
CN5	Micro SD Card
CN6	Dual USB 2.0
CN7	RS-485 Phoenix Connector (Isolation)
CN8	CANBus Phoenix Connector
CN9	USB OTG
CN14	COM Port 1 Phoenix Connector
CN15	Dual 1GbE RJ-45 Port
CN16	COM Port 2 Phoenix Connector
CN17	Full-size Mini Card
CN24	UART Debug Port Internal Wafer
CN25	RTC Battery Internal Wafer
CN28	HDMI
CN29	DC In
U7	I210 EEPROM Socket

2.4.1 CM4 B2B Connector A (CN1)
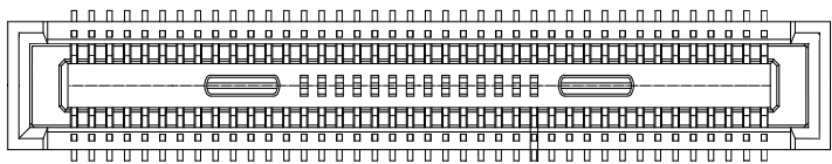
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	GND
2	GND	GND	GND
3	Ethernet_Pair3_P	DIFF	
4	Ethernet_Pair1_P	DIFF	
5	Ethernet_Pair3_N	DIFF	
6	Ethernet_Pair1_N	DIFF	
7	GND	GND	GND
8	GND	GND	GND
9	Ethernet_Pair2_N	DIFF	
10	Ethernet_Pair0_N	DIFF	
11	Ethernet_Pair2_P	DIFF	
12	Ethernet_Pair0_P	DIFF	
13	GND	GND	GND
14	GND	GND	GND
15	Ethernet_nLED3	IN/OUT	
16	Ethernet_SYNC_IN	IN	
17	Ethernet_nLED2	IN/OUT	
18	Ethernet_SYNC_OUT	OUT	
19	Ethernet_nLED1	IN/OUT	
20	EEPROM_nWP	IN/OUT	
21	Pi_nLED_Activity	IN/OUT	
22	GND	GND	GND
23	GND	GND	GND
24	GPIO26	IN/OUT	
25	GPIO21	IN/OUT	
26	GPIO19	IN/OUT	

Pin	Pin Name	Signal Type	Signal Level
27	GPIO20	IN/OUT	
28	GPIO13	IN/OUT	
29	GPIO16	IN/OUT	
30	GPIO6	IN/OUT	
31	GPIO12	IN/OUT	
32	GND	GND	GND
33	GND	GND	GND
34	GPIO5	IN/OUT	
35	ID_SC	IN/OUT	
36	ID_SD	IN/OUT	
37	GPIO7	IN/OUT	
38	GPIO11	IN/OUT	
39	GPIO8	IN/OUT	
40	GPIO9	IN/OUT	
41	GPIO25	IN/OUT	
42	GND	IN/OUT	GND
43	GND	IN/OUT	GND
44	GPIO10	IN/OUT	
45	GPIO24	IN/OUT	
46	GPIO22	IN/OUT	
47	GPIO23	IN/OUT	
48	GPIO27	IN/OUT	
49	GPIO18	IN/OUT	
50	GPIO17	IN/OUT	
51	GPIO15	IN/OUT	
52	GND	IN/OUT	GND
53	GND	IN/OUT	GND
54	GPIO4	IN/OUT	
55	GPIO14	IN/OUT	
56	GPIO3	IN/OUT	
57	SD_CLK	OUT	
58	GPIO2	IN/OUT	
59	GND	GND	GND

Pin	Pin Name	Signal Type	Signal Level
60	GND	GND	GND
61	SD_DAT3	IN/OUT	
62	SD_CMD	IN/OUT	
63	SD_DAT0	IN/OUT	
64	SD_DAT5	IN/OUT	
65	GND	GND	GND
66	GND	GND	GND
67	SD_DAT1	IN/OUT	
68	SD_DAT4	IN/OUT	
69	SD_DAT2	IN/OUT	
70	SD_DAT7	IN/OUT	
71	GND	GND	GND
72	SD_DAT6	IN/OUT	
73	SD_VDD_OVERRIDE	IN/OUT	
74	GND	GND	GND
75	SD_PWR_ON	OUT	
76	Reserved		
77	+5V	PWR	+5V
78	GPIO_VREF	IN/OUT	
79	+5V	PWR	+5V
80	SCL0	IN/OUT	
81	+5V	PWR	+5V
82	SDA0	IN/OUT	
83	+5V	PWR	+5V
84	CM4_3.3V	PWR	+3.3V
85	+5V	PWR	+5V
86	CM4_3.3V	PWR	+3.3V
87	+5V	PWR	+5V
88	CM4_1.8V	PWR	+1.8V
89	WL_nDisable	IN/OUT	
90	CM4_1.8V	PWR	+1.8V
91	BT_nDisable	IN/OUT	
92	RUN_PG	IN/OUT	

Pin	Pin Name	Signal Type	Signal Level
93	nRPIBOOT	IN/OUT	
94	AnalogIP1	IN	
95	PI_LED_nPWR	OUT	
96	AnalogIP0	IN	
97	Camera_GPIO	IN/OUT	
98	GND	GND	GND
99	GLOBAL_EN	IN	
100	nEXTRST	OUT	

2.4.2   CM4 B2B Connector B (CN2)
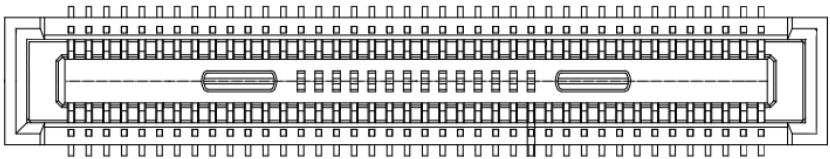
Pin	Pin Name	Signal Type	Signal Level
101	USB_OTG_ID	IN	
102	PCIe_CLK_nREQ	IN	
103	USB_N	DIFF	
104	Reserved		
105	USB_P	DIFF	
106	Reserved		
107	GND	GND	GND
108	GND	GND	GND
109	PCIe_nRST	OUT	
110	PCIe_CLK_P	DIFF	
111	VDAC_COMP	OUT	
112	PCIe_CLK_N	DIFF	
113	GND	GND	GND
114	GND	GND	GND
115	CAM1_D0_N	IN	
116	PCIe_RX_P	IN	

Pin	Pin Name	Signal Type	Signal Level
117	CAM1_D0_P	IN	
118	PCIe_RX_N	IN	
119	GND	GND	GND
120	GND	GND	GND
121	CAM1_D1_N	IN	
122	PCIe_TX_P	OUT	
123	CAM1_D1_P	IN	
124	PCIe_TX_N	OUT	
125	GND	GND	GND
126	GND	GND	GND
127	CAM1_C_N	DIFF	
128	CAM0_D0_N	DIFF	
129	CAM1_C_P	DIFF	
130	CAM0_D0_P	DIFF	
131	GND	DIFF	GND
132	GND	DIFF	GND
133	CAM1_D2_N	DIFF	
134	CAM0_D1_N	DIFF	
135	CAM1_D2_P	DIFF	
136	CAM0_D1_P	DIFF	
137	GND	GND	GND
138	GND	GND	GND
139	CAM1_D3_N	DIFF	
140	CAM0_C_N	DIFF	
141	CAM1_D3_P	DIFF	
142	CAM0_C_P	DIFF	
143	HDMI1_HOTPLUG	IN	
144	GND	GND	GND
145	HDMI1_SDA	IN/OUT	
146	HDMI1_TX2_P	DIFF	
147	HDMI1_SCL	IN/OUT	
148	HDMI1_TX2_N	DIFF	
149	HDMI1_CEC	IN	

Pin	Pin Name	Signal Type	Signal Level
150	GND	GND	GND
151	HDMI0_CEC	IN	
152	HDMI1_TX1_P	DIFF	
153	HDMI0_HOTPLUG	IN	
154	HDMI1_TX1_N	DIFF	
155	GND	GND	GND
156	GND	GND	GND
157	DSI0_D0_N	DIFF	
158	HDMI1_TX0_P	DIFF	
159	DSI0_D0_P	DIFF	
160	HDMI1_TX0_N	DIFF	
161	GND	GND	GND
162	GND	GND	GND
163	DSI0_D1_N	DIFF	
164	HDMI1_CLK_P	DIFF	
165	DSI0_D1_P	DIFF	
166	HDMI1_CLK_N	DIFF	
167	GND	GND	GND
168	GND	GND	GND
169	DSI0_C_N	DIFF	
170	HDMI0_TX2_P	DIFF	
171	DSI0_C_P	DIFF	
172	HDMI0_TX2_N	DIFF	
173	GND	GND	GND
174	GND	GND	GND
175	DSI1_D0_N	DIFF	
176	HDMI0_TX1_P	DIFF	
177	DSI1_D0_P	DIFF	
178	HDMI0_TX1_N	DIFF	
179	GND	GND	GND
180	GND	GND	GND
181	DSI1_D1_N	DIFF	
182	HDMI0_TX0_P	DIFF	

Pin	Pin Name	Signal Type	Signal Level
183	DSI1_D1_P	DIFF	
184	HDMI0_TX0_N	DIFF	
185	GND	GND	GND
186	GND	GND	GND
187	DSI1_C_N	DIFF	
188	HDMI0_CLK_P	DIFF	
189	DSI1_C_P	DIFF	
190	HDMI0_CLK_N	DIFF	
191	GND	DIFF	GND
192	GND	DIFF	GND
193	DSI1_D2_N	DIFF	
194	DSI1_D3_N	DIFF	
195	DSI1_D2_P	DIFF	
196	DSI1_D3_P	DIFF	
197	GND	GND	GND
198	GND	GND	GND
199	HDMI0_SDA	IN/OUT	
200	HDMI0_SCL	IN/OUT	

2.4.3 Micro SD Card (CN5)
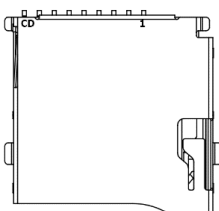
Pin	Pin Name	Signal Type	Signal Level
1	SD_DAT2	IN/OUT	
2	SD_DAT3	IN/OUT	
3	SD_CMD	IN/OUT	
4	SD_PWR	PWR	+3.3V

Pin	Pin Name	Signal Type	Signal Level
5	SD_CLK	OUT	
6	GND	GND	GND
7	SD_DAT0	IN/OUT	
8	SD_DAT1	IN/OUT	
9	CARD_DETECT	IN	

2.4.4   Dual USB 2.0 (CN6)
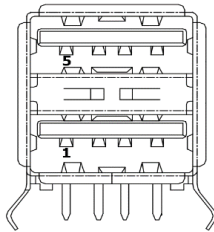
Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	USB2_2_DN	DIFF	
3	USB2_2_DP	DIFF	
4	GND	GND	GND
5	+5VSB	PWR	+5V
6	USB2_3_DN	DIFF	
7	USB2_3_DP	DIFF	
8	GND	GND	GND

2.4.5   RS-485 Phoenix Connector (CN7)
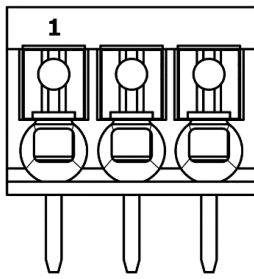
Pin	Pin Name	Signal Type	Signal Level
1	485_A1	IN/OUT	
2	485_B1	IN/OUT	
3	GND	GND	GND

2.4.6   CANBus Phoenix Connector (CN8)
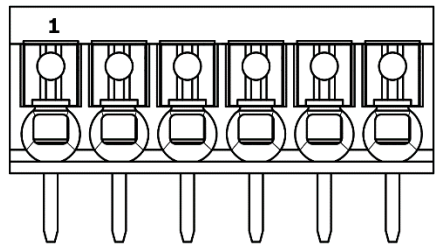
Pin	Pin Name	Signal Type	Signal Level
1	CAN1_TX	OUT	
2	CAN1_RX	IN	
3	GND	GND	GND
4	CAN2_TX	OUT	
5	CAN2_RX	IN	
6	GND	GND	GND

2.4.7   OTG (CN9)
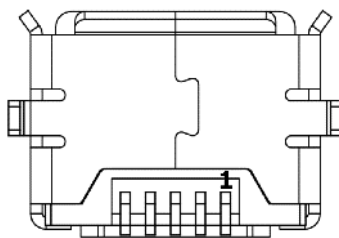
Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	USB2_Debug_DN	DIFF	
3	USB2_Debug_DP	DIFF	
4	USBOTG_ID	IN	
5	GND	GND	GND

2.4.8   COM Port 1 Phoenix Connector (CN14)
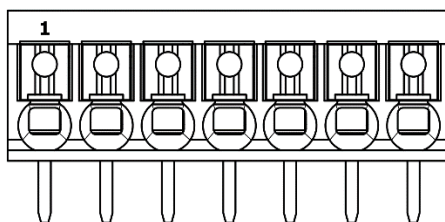
COM Port 1 RS-232			
Pin	Pin Name	Signal Type	Signal Level
1	DCD1	IN	±9V / ±5V
2	RXD1	IN	±9V / ±5V
3	TXD1	OUT	±9V / ±5V
4	DTR1	OUT	±9V / ±5V
5	RTS1	OUT	±9V / ±5V
6	CTS1	IN	±9V / ±5V
7	GND	GND	GND

COM Port 1 RS-422			
Pin	Pin Name	Signal Type	Signal Level
1	RS422_TX-	OUT	±9V / ±5V
2	RS422_TX+	OUT	±9V / ±5V
3	RS422_RX+	IN	±9V / ±5V
4	RS422_RX-	IN	±9V / ±5V
7	GND	GND	GND

COM Port 1 RS-485			
Pin	Pin Name	Signal Type	Signal Level
1	RS485_D-	IN/OUT	±9V / ±5V
2	RS485_D+	IN/OUT	±9V / ±5V
7	GND	GND	GND

2.4.9   Dual 1GbE RJ-45 Port (CN15)
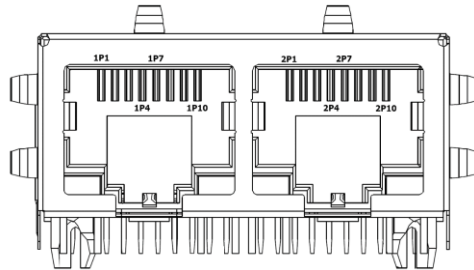
Pin	Pin Name	Signal Type	Signal Level
1L1	LAN1_LEDY-	IN/OUT	
1L2	LAN1_LEDY+	IN/OUT	
1L3	LAN1_LEDG	IN/OUT	
1L4	LAN1_LEDO	IN/OUT	
1P1	LAN1_MDI0_P	DIFF	
1P2	LAN1_MDI0_N	DIFF	
1P3	LAN1_MDI1_P	DIFF	
1P4	LAN1_MDI1_N	DIFF	
1P5	LAN1_CT5		

Pin	Pin Name	Signal Type	Signal Level
1P6	LAN1_CT6		
1P7	LAN1_MDI2_P	DIFF	
1P8	LAN1_MDI2_N	DIFF	
1P9	LAN1_MDI3_P	DIFF	
1P10	LAN1_MDI3_N	DIFF	
2L1	LAN2_LEDY-	IN/OUT	
2L2	LAN2_LEDY+	IN/OUT	
2L3	LAN2_LEDG	IN/OUT	
2L4	LAN2_LEDO	IN/OUT	
2P1	LAN2_MDI0_P	DIFF	
2P2	LAN2_MDI0_N	DIFF	
2P3	LAN2_MDI1_P	DIFF	
2P4	LAN2_MDI1_N	DIFF	
2P5	LAN2_CT5		
2P6	LAN2_CT6		
2P7	LAN2_MDI2_P	DIFF	
2P8	LAN2_MDI2_N	DIFF	
2P9	LAN2_MDI3_P	DIFF	
2P10	LAN2_MDI3_N	DIFF	

Note: The LED light definitions for the LAN2 port follow the specifications used in the Raspberry Pi Compute Module 4.

2.4.10   COM Port 2 Phoenix Connector (CN16)
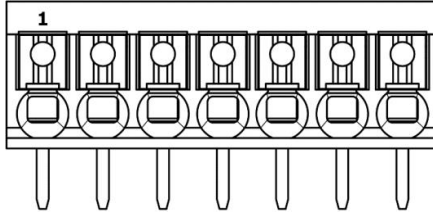
COM Port 2 RS-232			
Pin	Pin Name	Signal Type	Signal Level
1	DCD2	IN	±9V / ±5V
2	RXD2	IN	±9V / ±5V
3	TXD2	OUT	±9V / ±5V
4	DTR2	OUT	±9V / ±5V
5	RTS2	OUT	±9V / ±5V
6	CTS2	IN	±9V / ±5V
7	GND	GND	GND

COM Port 2 RS-422			
Pin	Pin Name	Signal Type	Signal Level
1	RS422_TX-	OUT	±9V / ±5V
2	RS422_TX+	OUT	±9V / ±5V
3	RS422_RX+	IN	±9V / ±5V
4	RS422_RX-	IN	±9V / ±5V
7	GND	GND	GND

COM Port 2 RS-485			
Pin	Pin Name	Signal Type	Signal Level
1	RS485_D-	IN/OUT	±9V / ±5V
2	RS485_D+	IN/OUT	±9V / ±5V
7	GND	GND	GND

2.4.11   Full-size Mini Card (CN17)
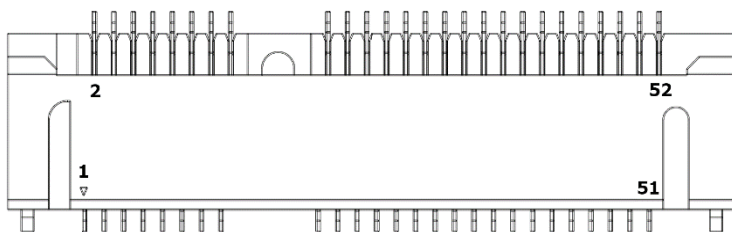
Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	NC	
2	+3.3V	PWR	+3.3V
3	NC	NC	
4	GND	GND	GND
5	NC	NC	
6	+1.5V	NC	
7	PCIE_CLK_REQ#	NC	
8	NC	NC	
9	GND	GND	GND
10	NC	NC	
11	PCIE_REF_CLK-	NC	
12	NC	NC	
13	PCIE_REF_CLK+	NC	
14	NC	NC	
15	GND	GND	GND
16	NC	NC	
17	NC	NC	
18	GND	GND	GND
19	NC	NC	
20	W_DISABLE#	OUT	
21	GND	GND	GND
22	PCIE_RST3	OUT	
23	PCIE_RX-/SATA_RX-	NC	
24	+3.3V	PWR	+3.3V
25	PCIE_RX+/SATA_RX+	NC	

Pin	Pin Name	Signal Type	Signal Level
26	GND	GND	GND
27	GND	GND	GND
28	+1.5V	NC	
29	GND	GND	GND
30	SMB_CLK	TP	
31	PCIE_TX-/SATA_TX-	NC	
32	SMB_DATA	TP	
33	PCIE_TX+/SATA_TX+	NC	
34	GND	GND	GND
35	GND	GND	GND
36	USB2_1_DN	DIFF	
37	GND	GND	GND
38	USB2_1_DP	DIFF	
39	+3.3V	PWR	+3.3V
40	GND	GND	GND
41	+3.3V	PWR	+3.3V
42	NC	NC	
43	GND	GND	GND
44	NC	NC	
45	NC	NC	
46	NC	NC	
47	NC	NC	
48	+1.5V	NC	
49	NC	NC	
50	GND	GND	GND
51	NC	NC	
52	+3.3V	PWR	+3.3V

2.4.12   UART Debug Port Internal Wafer (CN24)
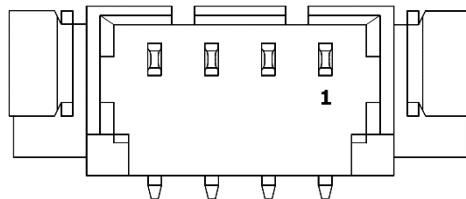
Pin	Pin Name	Signal Type	Signal Level
1	+3.3V	PWR	+3.3V
2	UART0_TXD	OUT	
3	UART0_RXD	IN	
4	GND	GND	GND

2.4.13   RTC Battery Internal Wafer (CN25)
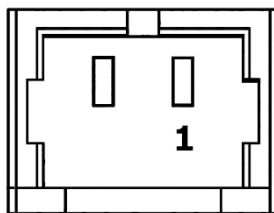
Pin	Pin Name	Signal Type	Signal Level
1	+3.3V	PWR	+3.3V
2	GND	GND	GND

2.4.14   HDMI (CN28)
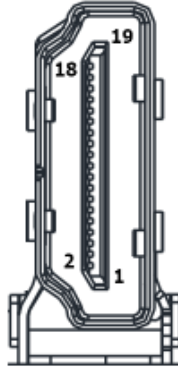
Pin	Pin Name	Signal Type	Signal Level
1	HDMI0_TX2+	DIFF	
2	GND	GND	GND
3	HDMI0_TX2-	DIFF	
4	HDMI0_TX1+	DIFF	
5	GND	GND	GND
6	HDMI0_TX1-	DIFF	
7	HDMI0_TX0+	DIFF	
8	GND	GND	GND
9	HDMI0_TX0-	DIFF	
10	HDMI0_CLK+	DIFF	
11	GND	GND	GND
12	HDMI0_CLK-	DIFF	
13	HDMI0_CEC	IN/OUT	
14	N/A	N/A	N/A
15	HDMI0_SCL	IN/OUT	
16	HDMI0_SDA	IN/OUT	
17	GND	GND	GND
18	+V5S	PWR	+5V
19	HDMI0_HPD	IN	

2.4.15   DC In (CN29)
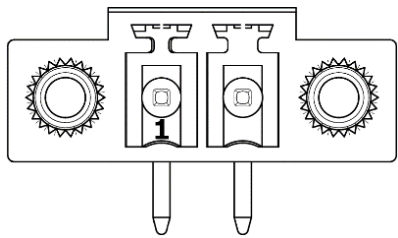
Pin	Pin Name	Signal Type	Signal Level
1	+DC_IN	PWR	+9~+36V
2	GND	GND	GND

2.4.16   EEPROM Socket (U7)
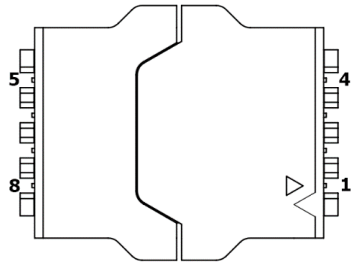
Pin	Pin Name	Signal Type	Signal Level
1	NVM_CS#	IN	
2	NVM_SO	OUT	
3	NVM_WP#	IN	
4	GND	GND	GND
5	NVM_SI	IN	
6	NVM_SK	OUT	
7	NVM_HOLD#	IN	
8	+3.3V	PWR	+3.3V

Chapter 3

Product Setup and Configuration

3.1   System Account Management

3.1.1   Debug Console

N/A.

3.1.2   Log In

Log into the system using the below credentials.

Login Settings	
Username	root
Password	Pw#12345

3.2   I/O Control Command and Example

3.2.1   CANBus

Please refer to section 2.4.6 CANBus Phoenix Connector (CN8).

Pin	Pin Name	Signal Type	Signal level	
1	CAN1H_R	I/O		
2	CAN1L_R	I/O		
3	GND	GND		
4	CAN2H_R	I/O		
5	CAN2L_R	I/O		
6	GND	GND		

Step 1: Connect pin 1 to pin 4 and pin 2 to pin 5.

Step 2: Set up CAN0 and CAN1.

```
root@CM4:~# ip link set can0 type can bitrate 1000000
root@CM4:~# ifconfig can0 up
root@CM4:~# ip link set can1 type can bitrate 1000000
```

`root@CM4:~# ifconfig can1 up`

Step 3: Use candump on CAN0.

`root@CM4:~# candump can0 &`

Step 4: Use cansend on CAN1.

`root@CM4:~# cansend can1 5A1#11.2233.44556677.88`

Output:

`can0        5A1    [8]   11 22 33 44 55 66 77 88`

3.2.2   DIO
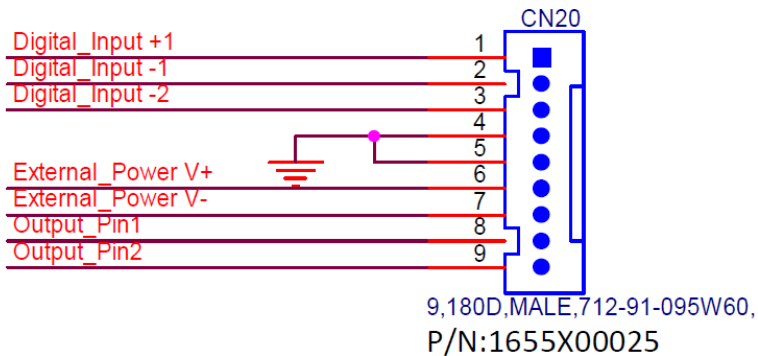
Voltage input range: 9V ~ 24V.

Connection Instructions:

1. Connect pin 1 to VCC.

2. Connect pin 2 and pin 3 to GND.

Digital Inputs (DI):

DI_1 (gpio23):

- DI_1 will be '1' if VCC > 9V and '0' if VCC <= 8V.

Reading DI_1:

```
root@CM4:~# cd /sys/class/gpio
root@CM4:/sys/class/gpio# echo 23 > export
root@CM4:/sys/class/gpio# cd gpio23/
root@CM4:/sys/class/gpio# echo in > direction
root@CM4:/sys/class/gpio/gpio23# cat value
```

- (1) # if VCC > 9V

```
root@CM4:/sys/class/gpio/gpio23# cat value
```

- (0) # if VCC <= 8V

DI_2 (gpio25):

- DI_2 will be '1' if VCC > 9V and '0' if VCC <= 8V.

Reading DI_2:

```
root@CM4:~# cd /sys/class/gpio
root@CM4:/sys/class/gpio# echo 25 > export
root@CM4:/sys/class/gpio# cd gpio25/
root@CM4:/sys/class/gpio# echo in > direction
root@CM4:/sys/class/gpio/gpio25# cat value
```

- (1) # if VCC > 9V

```
root@CM4:/sys/class/gpio/gpio25# cat value
```

- (0) # if VCC <= 8V

Digital Outputs (DO) (Open Drain):

Connection Instructions:

1. Connect pin 6 to VCC.

2. Connect pin 7 to GND.

3. Connect pin 8 to VCC through a resistor (Max Current 600mA).

4. Connect pin 9 to VCC through a resistor (Max Current 600mA)

Note: Recommended resistor: 3k 1/4W.

DO_1 (gpio17):

Set DO_1 to be output:

`root@CM4:sudo raspi-gpio set 17 op`

Set DO_1 (the voltage of pin 8 is 0V):

`root@CM4:sudo raspi-gpio set 17 dh`

Clear DO_1 (the voltage of pin 8 is VCC):

`root@CM4: sudo raspi-gpio set 17 dl`

DO_2 (gpio24):

Set DO_2 to be output:

`root@CM4:sudo raspi-gpio set 24 op`

Set DO_2 (the voltage of pin 9 is 0V):

`root@CM4:sudo raspi-gpio set 24 dh`

Clear DO_2 (the voltage of pin 9 is VCC):

`root@CM4: sudo raspi-gpio set 24 dl`

3.2.3   Ethernet

Step 1: Check the Ethernet Interface

root@CM4:~# ifconfig

Output:

```
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>    mtu 1500
        inet 172.16.17.124    netmask 255.255.255.0    broadcast 172.16.17.255
        inet6 fe80::f5f1:f0cf:b70a:cc2f    prefixlen 64    scopeid 0x20<link>
        ether e4:5f:01:8a:61:b3    txqueuelen 1000    (Ethernet)
        RX packets 7457    bytes 1000406 (976.9 KiB)
        RX errors 0    dropped 1612    overruns 0    frame 0
        TX packets 27    bytes 3635 (3.5 KiB)
        TX errors 0    dropped 0    overruns 0    carrier 0    collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>    mtu 1500
        inet 172.16.17.95    netmask 255.255.255.0    broadcast 172.16.17.255
        inet6 fe80::af58:5b1c:b960:f55d    prefixlen 64    scopeid 0x20<link>
        ether 00:07:32:00:00:01    txqueuelen 1000    (Ethernet)
        RX packets 9638    bytes 1206495 (1.1 MiB)
        RX errors 0    dropped 1613    overruns 0    frame 0
        TX packets 1895    bytes 272939 (266.5 KiB)
        TX errors 0    dropped 0 overruns 0    carrier 0    collisions 0
        device memory 0x600000000-60007ffff

lo: flags=73<UP,LOOPBACK,RUNNING>    mtu 65536
        net 127.0.0.1    netmask 255.0.0.0
        inet6 ::1    prefixlen 128    scopeid 0x10<host>
        loop    txqueuelen 1000    (Local Loopback)
        RX packets 19    bytes 2141 (2.0 KiB)
        RX errors 0    dropped 0    overruns 0    frame 0
        TX packets 19    bytes 2141 (2.0 KiB)
        TX errors 0    dropped 0 overruns 0    carrier 0    collisions 0
```

Step 2: Ping Test

Ping using eth0:

```
root@CM4:~# ping google.com -I eth0 -c 1
PING google.com (172.217.160.110) from 172.16.17.124 eth0: 56(84) bytes of data.
64 bytes from tsa03s06-in-f14.1e100.net (172.217.160.110): icmp_seq=1 ttl=115
time=3.33 ms
```

```
--- google.com ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 3.326/3.326/3.326/0.000 ms
root@CM4:~# ping google.com -I eth1 -c 1
PING google.com (172.217.160.110) from 172.16.17.95 eth1: 56(84) bytes of data.
64 bytes from tsa03s06-in-f14.1e100.net (172.217.160.110): icmp_seq=1 ttl=115
time=3.91 ms

--- google.com ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 3.911/3.911/3.911/0.000 ms
```

3.2.4   PCIe

Step 1: Check the PCIe devices.
```
root@CM4:~# lspci -nn
00:00.0 PCI bridge [0604]: Broadcom Inc. and subsidiaries BCM2711 PCIe Bridge
[14e4:2711] (rev 20)
01:00.0 Ethernet controller [0200]: Intel Corporation I210 Gigabit Network
Connection [8086:1533] (rev 03)
```

3.2.5   RTC

Step 1: Display the RTC time..
```
root@CM4:~# hwclock -r
2024-05-20 11:04:41.208851+01:00
```
Step 2: Synchronize the system time to the RTC.
```
root@CM4:~# date 040310422024 && hwclock -w && date
Wed    3 Apr 10:42:00 CST 2024
Wed    3 Apr 10:42:01 CST 2024
```
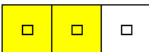
3.2.6   SD Card
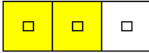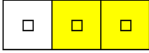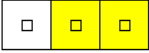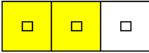
N/A.
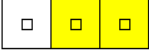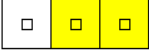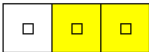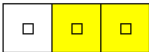
3.2.7 Serial

3.2.7.1 Jumper Setting

COM 1 Mode Selection (CN10/CN12/CN19)			
CN10	1 2 3	1 2 3	1 2 3	1 2 3
CN12	1 2 3	1 2 3	1 2 3	1 2 3

Standard Gateway System

SRG-CM4

COM 1 Mode Selection (CN10/CN12/CN19)			
CN19	1 2 3	1 2 3	1 2 3
	RS-232	RS-422	RS-485 (Driver)	RS-485 (Receiver)

COM 2 Mode Selection (CN11/CN13/CN21)			
CN11	1 2 3	1 2 3	1 2 3	1 2 3
CN13	1 2 3	1 2 3	1 2 3	1 2 3
CN21	1 2 3	1 2 3	1 2 3	1 2 3
	RS-232	RS-422	RS-485 (Driver)	RS-485 (Receiver)

3.2.7.2   Pin Definition

Please refer to section 2.3.3 COM 1 Mode Selection (CN10/CN12/CN19).

Pin	Pin Name		
	RS-232	RS-422	RS-485
1	DCD1	T(B)-	R(B)-/T(B)-
2	RXD1	T(A)+	R(A)+/T(A)+
3	TXD1	R(A)+	NC
4	DTR1	R(B)-	NC
5	RTS1	NC	NC
6	CTS1	NC	NC
7	GND	GND	GND

3.2.7.3 Device Node

Interface	Device Node
COM1	/dev/ttyAMA2
COM2	/dev/ttyAMA3
RS-485(Isolation)	/dev/ttyAMA4

3.2.7.4 RS-232

Connection Instructions:

1. Connect COM1 pin 2 to COM2 pin 3.

2. Connect COM1 pin 3 to COM2 pin 2.

Communication Setup:

Step 1: Disable echo on COM2:

root@CM4:~# stty -F /dev/ttyAMA3 -echo

Step 2: Read from COM2 in the background:

root@CM4:~# cat /dev/ttyAMA3 &
[1] 1784

Step 3: Send data from COM1:

root@CM4:~# echo "AAEON" > /dev/ttyAMA2

Expected output on COM2:

root@CM4:~# AAEON

Step 4: Disable echo on COM1:

root@CM4:~# stty -F /dev/ttyAMA2 -echo

Step 5: Read from COM1 in the background:

root@CM4:~# cat /dev/ttyAMA2 &
[1] 1110

Step 6: Send data from COM2:

root@CM4:~# echo "AAEON" > /dev/ttyAMA3

Expected output on COM1:

root@CM4:~# AAEON

3.2.7.5   RS-422

Connection Instructions:

1.   Connect COM1 pin 1 to COM2 pin 4.

2.   Connect COM1 pin 2 to COM2 pin 3.

3.   Connect COM1 pin 3 to COM2 pin 2.

4.   Connect COM1 pin 4 to COM2 pin 1.

Communication Setup:

Step 1: Disable echo on COM2:

```
root@CM4:~# stty -F /dev/ttyAMA3 -echo
```

Step 2: Read from COM2 in the background:

```
root@CM4:~# cat /dev/ttyAMA3 &
[1] 1111
```

Step 3: Send data from COM1:

```
root@CM4:~# echo "AAEON" > /dev/ttyAMA2
```

Expected output on COM2:

```
root@CM4:~# AAEON
```

Step 4: Disable echo on COM1:

```
root@CM4:~# stty -F /dev/ttyAMA2 -echo
```

Step 5: Read from COM1 in the background:

```
root@CM4:~# cat /dev/ttyAMA2 &
[1] 1114
```

Step 6: Send data from COM2:

```
root@CM4:~# echo "AAEON" > /dev/ttyAMA3
```

Expected output on COM1:

```
root@CM4:~# AAEON
```

3.2.7.6   RS-485

Connection Instructions:

1.   Connect COM1 pin 1 to COM2 pin 1.

2.   Connect COM1 pin 2 to COM2 pin 2.

Save the following content to the file uart_test.py:

```
import serial
comA = serial.Serial("/dev/ttyAMA2", 115200, timeout=1)
comB = serial.Serial("/dev/ttyAMA3", 115200, timeout=1)
comA.setRTS(1)    # sender
comB.setRTS(0)    # receiver
data_len = comA.write(b'test string')
data = comB.read(data_len)
print(data)
comA.close()
comB.close()
```

Execute the script:

```
root@CM4:~# python3 uart_test.py
```

The expected output should be:

```
b'test string'
```

3.2.7.7   RS-485-Isolation (COM 2 to Isolation)

Connection Instructions:

1.   Connect COM2 pin 1 to RS-485-Isolation pin 2.

2.   Connect COM2 pin 2 to RS-485-Isolation pin 1.

Save the following content to the file **uart_test.py**:

import serial

```
comA = serial.Serial("/dev/ttyAMA3", 115200, timeout=1)
comB = serial.Serial("/dev/ttyAMA4", 115200, timeout=1)
comA.setRTS(1)    # sender
comB.setRTS(0)    # receiver
data_len = comA.write(b'test string')
data = comB.read(data_len)
print(data)
comA.close()
```

```
comB.close()
```

Execute the script:

```
root@CM4:~# python3 uart_test.py
```

The expected output should be:

```
b'test string'
```

3.2.8   TPM

Install the tpm2-tools package:

```
root@CM4:~# apt install -y tpm2-tools
```

Retrieve the TPM NV (non-volatile) index handles:

```
root@CM4:~# tpm2_getcap handles-nv-index
```

Expected output:

```
- 0x1C00002
- 0x1C0000A
```

3.2.9   USB

To list USB devices by their hierarchy, use the following command:

```
/:  Bus 01.Port 1: Dev 1, Class=root_hub, Driver=xhci-hcd/1p, 480M
    |__ Port 1: Dev 2, If 0, Class=Hub, Driver=hub/4p, 480M
        |__ Port 2: Dev 3, If 0, Class=Hub, Driver=hub/4p, 480M
            |__ Port 3: Dev 7, If 0, Class=Human Interface Device, Driver=usbhid, 1.5M
            |__ Port 1: Dev 5, If 0, Class=Mass Storage, Driver=usb-storage, 480M
            |__ Port 4: Dev 8, If 0, Class=Human Interface Device, Driver=usbhid, 1.5M
            |__ Port 4: Dev 8, If 1, Class=Human Interface Device, Driver=usbhid, 1.5M
            |__ Port 2: Dev 6, If 0, Class=Mass Storage, Driver=usb-storage, 480M
        |__ Port 4: Dev 4, If 0, Class=, Driver=f81604, 12M
```

3.2.10   Watchdog Timer

Save the following content to the file named **wdt.c**:

```
#include <stdio.h>
#include <errno.h>
```

```
#include <fcntl.h>
#include <linux/watchdog.h>
#include <sys/ioctl.h>
#include <unistd.h>
#include <stdlib.h>

int main(int argc, char *argv[])
{
    int fd, timeout;

    // Open watchdog device
    fd = open("/dev/watchdog", O_RDWR);
    if (fd == -1) {
    perror("Error opening watchdog device");
    return 1;
    }
    // Set timeout in seconds
    timeout = 3;
    if (ioctl(fd, WDIOC_SETTIMEOUT, &timeout) != 0) {
    perror("Error setting watchdog timeout");
    close(fd);
    return 1;
    }
    printf("Watchdog started. System will reboot after %d seconds\n",
    timeout);
    // Main loop to keep resetting the watchdog
    while (1) {
    sleep(1);
    system("date"); // Print the date/time to demonstrate the watchdog reset
    }
    close(fd);
    return 0;
}
```

Compile the **wdt.c** file:

```
root@CM4:~# gcc wdt.c -o wdt
```

Run the compiled program:

```
root@CM4:~# ./wdt
```

Expected output:

```
Watchdog started. System will reboot after 3 seconds
```

The program will continuously reset the watchdog timer every second (sleep(1)), ensuring that the system does not reset.

3.2.11   LED

Red LED (UP) ON/OFF Test

```
root@CM4:~# cd /sys/class/gpio
root@CM4:/sys/class/gpio# echo 16 > export
root@CM4:/sys/class/gpio# cd gpio16/
root@CM4:/sys/class/gpio/gpio16# echo out > direction
```

Turn off LED:

```
root@CM4:/sys/class/gpio/gpio16# echo 1 > value
```

Turn on LED:

```
root@CM4:/sys/class/gpio/gpio16# echo 0 > value
```

Orange LED ON/OFF Test

```
root@CM4:~# cd /sys/class/gpio
root@CM4:/sys/class/gpio# echo 22 > export
root@CM4:/sys/class/gpio# cd gpio22/
root@CM4:/sys/class/gpio/gpio22# echo out > direction
```

Turn off LED:

```
root@CM4:/sys/class/gpio/gpio22# echo 1 > value
```

Turn on LED:

```
root@CM4:/sys/class/gpio/gpio22# echo 0 > value
```

Red LED (Down) ON/OFF Test

> root@CM4:~# cd /sys/class/gpio
> root@CM4:/sys/class/gpio# echo 27 > export
> root@CM4:/sys/class/gpio# cd gpio27/
> root@CM4:/sys/class/gpio/gpio27# echo out > direction

Turn off LED:

> root@CM4:/sys/class/gpio/gpio27# echo 1 > value

Turn on LED:

> root@CM4:/sys/class/gpio/gpio27# echo 0 > value

These commands demonstrate how to control GPIO pins to turn LEDs on and off on

your system. Adjust the GPIO numbers (16, 22, 27) based on your specific hardware

configuration and the GPIO pin connected to each LED.

3.2.12   SW Button

GPIO Button Status Test

Release the SW Button & get the level:

> root@CM4:~# raspi-gpio get 26
> GPIO 26: level=1 fsel=0 func=INPUT pull=UP

Push the SW Button & get the level:

> root@CM4:~# raspi-gpio get 26
> GPIO 26: level=0 fsel=0 func=INPUT pull=UP

These commands demonstrate how to read the status (level) of a button connected to

GPIO pin 26. The level=1 indicates the button is released, and level=0 indicates the

button is pushed. Adjust GPIO pin number (26) based on your specific hardware setup.

3.3 Wireless Control Command and Example (4G, BT/Wi-Fi)

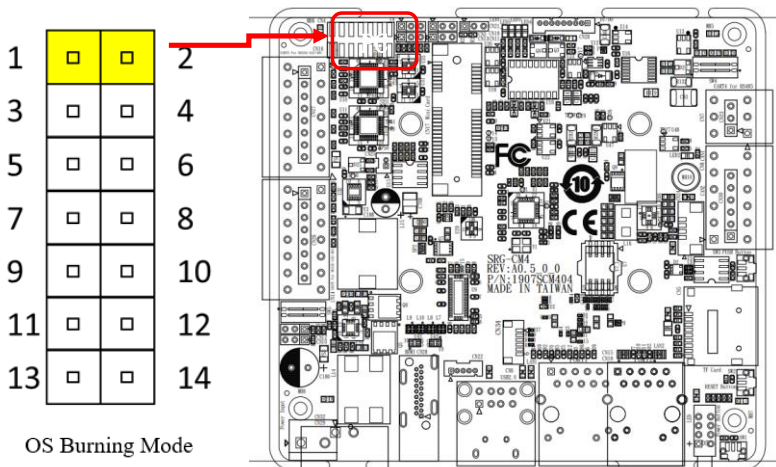### 3.3.1 4G

aaeon@raspberrypi:~$sudo su
aaeon@raspberrypi:~$lsusb
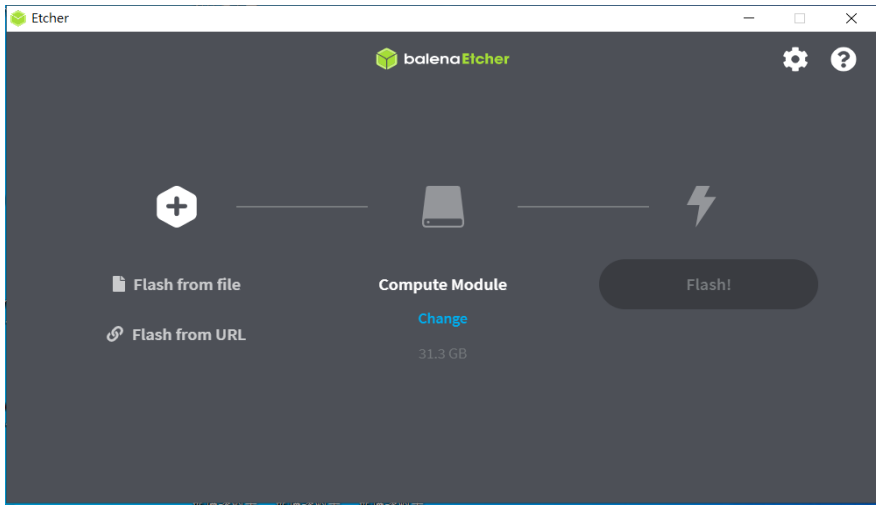

3.4 OS Installation

3.4.1 Flash SD Card or eMMC

Add Jumper & Micro-USB Cable: Connect a jumper to CN4 on and then connect a

micro-USB cable to your PC to establish a USB connection for flashing.

Run command:

```
rpiboot
```


3.4.2   Check Version

Command:

```
root@CM4:~#cat /etc/aaeon-release
```

Result:

```
PRETTY_NAME="Debian GNU/Linux 11 (bullseye)"
NAME="Debian GNU/Linux"
VERSION_ID="11"
VERSION="11 (bullseye)"
VERSION_CODENAME=bullseye
ID=debian
HOME_URL="https://www.debian.org/"
SUPPORT_URL="https://www.debian.org/support"
BUG_REPORT_URL="https://bugs.debian.org/"
IMAGE_VERSION="SRG-CM4 vXXX"
HW_INFO="Broadcom BCM2711 quad-core"
CREATE_DATE="XXXX/XX/XX"
```

This indicates that the system is running Debian GNU/Linux version 11 (codename "bullseye"). If you need to reference the specific version programmatically or in documentation, you can use the VERSION_ID field, which is set to "11" in this case.

Appendix A

Mating Connectors

A.1   List of Mating Connectors and Cables

The following table lists mating connectors and available cables.

Conn Label	Function	Mating Connector		Available Cable	Cable P/N
		Vendor	Model No.		
CN24	Internal Debug Connector	PINREX	712-P91-025WEH	N/A	N/A
CN25	Internal RTC Connector	JVE	24W1251-04MS1-11T-F-C	Battery Cable	175011301C