



Ruby 2 Technical Product Specification

CBM2r7RB

CBM2r7RBB

CBM2r6RB

CBM2r6RBB

CBM2r4RB

CBM2r4RBB

CBM2r3RB

CBM2r3RBB

Version 1.2, 07/20/2022

Preface

The purpose of this document is to provide a technical reference for customers and developers of the Simply NUC Ruby 2 family of products. Ruby 2 kit SKUs include CBM2r7RB, CBM2r6RB, CBM2r4RB and CBM2r3RB with board SKUs CBM2r7RBB, CBM2r6RBB, CBM2r4RBB and CBM2r3RBB.

Contents

Preface	2
Contents	2
Tables	4
Figures	5
1 Description	6
1.1 Overview	6
1.2 Processor	7
1.3 Integrated Graphics Processing Unit	7
1.4 Memory	8
1.5 Storage	8
1.5.1 SATA Interface	8
1.5.2 PCIe Interface	9
1.6 Networking	9
1.6.1 RJ-45 Connector for Networking Interface (LAN1)	9
1.6.2 RJ-45 Connector for Networking Interface (LAN2)	9
1.6.3 Wireless Networking Interface	10
2 Technical Reference	11
2.1 Motherboard Headers	11
2.1.1 Headers – Top of Board	11
2.1.1.1 Battery Header	12
2.1.1.2 APU Fan Header	12
2.1.1.3 Power Button	12
2.1.2 Headers – Bottom of Board	12
2.1.2.1 DDR4 SO-DIMM Sockets	14
2.1.2.2 M.2 for Storage	14

2.1.2.3	ATX/AT Jumper	16
2.1.2.4	M.2 for Radio	16
2.1.2.5	COM Header	17
2.1.2.6	USB 2.0 Header	18
2.1.2.7	Front Panel Header	19
2.1.2.8	Clear CMOS Jumper	20
2.1.2.9	SATA-III Connector	21
2.2	Chassis I/O Connectors	22
2.2.1	Connectors - Front Panel	22
2.2.2	Connectors - Rear Panel	23
2.3	Mechanical Dimensions	24
2.3.1	PCB Chassis Mount	24
2.3.2	System Height	25
3	Environmental Specifications	25
4	Version History	25

Tables

Table 1: APU Features	7
Table 2: GPU Features	8
Table 3: Top Side Header Definitions	11
Table 4: CPU Fan Header Pinout	12
Table 5: Bottom-Side Header Definitions	13
Table 6: M.2 Key-M SSD Pinout	14
Table 7: M.2 Key-E Pinout	16
Table 8: COM Header Pinout	18
Table 9: USB 2.0 Header Pinout	19
Table 10: Front Panel Header Pinout	19
Table 11: Power LED System Status	20
Table 12: SATA Connector Pinout	21
Table 13: Front Side Connections Defined	22
Table 14: Back Side Connections Defined	23
Table 15: Environmental Specifications	25

Figures

Figure 1: Top Side Header Locations	11
Figure 2: Bottom Side Header Locations	13
Figure 3: COM Header	18
Figure 4: USB 2.0 Header	18
Figure 5: Front Panel Header	19
Figure 6: CMOS Header Settings	21
Figure 7: SATA Connector	21
Figure 8: Front Side Connector Locations	22
Figure 9: Back Side Connector Locations	23
Figure 10: Motherboard Dimensions	24
Figure 11: System Height	25

1 Description

1.1 Overview

The Simply NUC CBM2r7RB, CBM2r6RB, CBM2r4RB and CBM2r3RB (code named Ruby 2) is a mini computer built with an AMD® Ryzen Embedded 5700U, 5600U, 5400U and 5300U accelerated processing unit, respectively.

Featuring the new AMD Ryzen™ 5000 mobile processor with Radeon™ Vega graphics and support for high-speed 3200 MHz DDR4 memory, Ruby 2 is a new performance-driven small form factor PC. At home, it enables you to stream 4K video, play games or finish your homework. At work, Ruby 2 keeps you productive -- perfect for content creation, multitasking and video conferencing. The Ryzen-based processors and high-speed memory remove bottlenecks, keeping you on task or helping you relax while tucked behind a TV or monitor.

Ruby 2 supports up to four displays simultaneously, with up to 4K resolution at 60Hz for each monitor. Dual Ethernet with 2.5Gbps and 1Gbps speeds allow you to connect to multiple networks, with one port providing DASH support for remote management of your mini. Ruby 2 also features TPM for sensitive communications where encryption is required. Take advantage of Intel® Wi-Fi 6 (802.11ax) with high-speed connectivity enhanced for efficient bandwidth usage in environments with many connected devices. Ruby 2 has ample accommodation for all your peripheral devices with four front 10Gbps SuperSpeed USB ports and two rear Hi-Speed USB type-A ports. If six USB ports is not enough, you can add a functional lid to your configuration for more I/O connections.

Ruby 2 is built on AMD's Zen 2 architecture, providing greater system performance over previous generations with advanced hyper-threading technologies driving faster speeds and enhanced graphics. Cloud computing, immersive gaming and streaming all demand increased compute performance with optimal energy efficiency, and AMD designed its "Zen 2" core to meet those demands with more core throughput, larger caches and powerful multi-threading capabilities.

Ruby 2 has the following features:

- AMD Ryzen™ 7 5700U/ Ryzen™ 5 5600U/ AMD Ryzen™ 3 5400U Ryzen™ 3 5300U
- AMD® Radeon™ Graphics
- Two DDR4-3200 SO-DIMM Sockets
- M.2 Slot for PCIe or SATA SSDs
- One 10/100/1000/2500Mbps Ethernet Port
- One 10/100/1000Mbps Ethernet Port
- M.2 Slot for Wi-Fi/ Bluetooth Radio
- One DisplayPort (4k, 60Hz)
- One HDMI Port (4k, 60Hz)
- Two Front USB 3.2 Gen 2 Type-C Ports (both support DP Alt Mode)
- Two Front USB 3.2 Gen 2 Type-A Ports
- Two Rear USB 2.0 Type-A Ports
- 3.5mm Combination Microphone/Headphone Jack

- Internal SATA-III Connector
- Internal Dual USB 2.0 Header
- Internal Serial Port Header Supporting RS-232, RS-422 and RS-485
- Replaceable Lid for Expandable Functionality
- Simply NUC Universal Chassis
- 19VDC 90W Power Supply Adapter
- 12V – 19V Input Power Supply Range

1.2 Processor

The Ruby 2 APUs have the following features.

Table 1: APU Features

Ruby 2	CBM2r7RB	CBM2r6RB	CBM2r4RB	CBM2r3RB
AMD APU	Ryzen 7 5700U	Ryzen 5 5600U	Ryzen 3 5400U	Ryzen 3 5300U
Cores	8	6	4	4
Threads	16	12	8	8
L1 Cache	8x 32KB (8-way) I-cache, 8x 32KB (8-way) D-cache	6x 32KB (8-way) I-cache 6x 32KB (8-way) D-cache	4x 32KB (8-way) I-cache, 4x 32KB (8-way) D-cache	4x 32KB (8-way) I-cache, 4x 32KB (8-way) D-cache
L2 Cache	8x 512KB (8-way) Unified	6x 512KB (8-way) Unified	4x 512KB (8-way) Unified	4x 512KB (8-way) Unified
L3 Cache	2x 4MB Shared	16MB Shared	8MB Shared	4MB Shared
Base Speed (Turbo) [MHz]	1800 (4300)	2300 (4200)	2600 (4000)	2600 (3800)
TDP (Configurable)[W]	25 (10-25)			
Integrated Graphics	Radeon RX Vega 8	Radeon RX Vega 7	Radeon RX Vega 6	Radeon RX Vega 6

■

1.3 Integrated Graphics Processing Unit

The Ruby 2 APU has an integrated Radeon graphics processing unit with the following features.

Table 2: GPU Features

Ruby 2	CBM2r7RB	CBM2r6RB	CBM2r4RB	CBM2r3RB
GPU	Radeon RX Vega 8	Radeon RX Vega 7	Radeon RX Vega 6	Radeon RX Vega 6
GPU Speed [MHz]	1900	1800	1600	1500
GPU Compute Units	8 (512 Shader Processors)	7 (448 Shader Processors)	5 (384 Shader Processors)	5 (384 Shader Processors)
GFLOPs	1792	1612	1229	896
Maximum 1080p Displays	4	4	4	4
Maximum 4k Displays	4	4	4	4
Maximum Single Display Resolution	4096 x 2160, 60Hz			
Display Interfaces	HDMI 2.0a, DP 1.2a, 2x USB-C (DP 1.2a via DP Alt Mode)			
Memory Size	System-Shared DDR4			
API Support	DirectX 12 (12_1), OpenGL 4.6, OpenCL 2.0, Vulkan 1.2, Shader Model 6.4			

1.4 Memory

Ruby 2 has two SO-DIMM sockets for system memory with the following features:

- 1.2V LP-DDR4 SDRAM SO-DIMMs supported
- Two memory channels with interleaved support
- Serial Presence Detect
- Unbuffered SO-DIMM support (both single- and dual-sided)
- Minimum 4GB SO-DIMM supported
- Up to 32GB SO-DIMMs supported per socket for a maximum total of 64GB of system memory
- Support for DDR4-3200 data rates

1.5

1.6 Storage

Ruby 2 has one M.2 key-M slot for a 2280 storage module supporting either a SATA or PCIe SSD.

1.6.1 SATA Interface

The M.2 slot is a key-M slot for a SATA 2280 M.2 module, up to 2TB in density. The SATA III port has a theoretical maximum transfer rate of 6Gbps.

1.6.2 PCIe Interface

The M.2 slot is a key-M slot for an PCIe 2280 M.2 module, up to 8TB in density. The PCIe 4.0 x4 interface on the port has a theoretical maximum transfer rate of 4GBps.

1.7 Networking

1.7.1 RJ-45 Connector for Networking Interface (LAN1)

Ruby 2 has a Realtek RTL8125BG gigabit controller that interfaces to on-board RJ-45 Ethernet connector (LAN1) to provide gigabit Ethernet connections. The RTL8125BG controller features

- Integrated 10M BASE-Tc and 100/1000M/2.5G BASE-T 802.3 compatible transceiver
- Supports 2.5G Lite (1G data rate) mode
- Auto-Negotiation with Extended Next Page capability (XNP)
- Compatible with NBASE-TT Alliance PHY Specification
- Supports pair swap/polarity/skew correction
- Crossover Detection & Auto-Correction
- Supports hardware ECC (Error Correction Code) function
- Supports hardware CRC (Cyclic Redundancy Check) function
- Transmit/Receive on-chip buffer support
- Supports PCI MSI (Message Signaled Interrupt) and MSI-X
- Supports power down/link down power saving/PHY disable mode
- Supports ECMA-393 ProxZzy Standard for sleeping hosts
- Supports LTR (Latency Tolerance Reporting)
- Wake-On-LAN and 'RealWoW!' Technology (remote wake-up) support
- Supports 32-set 128-byte Wake-Up Frame pattern exact matching
- Supports Microsoft WPI (Wake Packet Indication)
- Compatible with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
- Supports IEEE 1588v1, IEEE 1588v2, IEEE 802.1AS time synchronization
- Supports IEEE 802.1Qav credit-based shaper algorithm
- Supports IEEE 802.1P Layer 2 Priority Encoding
- Supports IEEE 802.1Q VLAN tagging
- Supports IEEE 802.1ad Double VLAN
- Supports IEEE 802.3az (Energy Efficient Ethernet)
- Supports IEEE 802.3bz (2.5GBase-T)
- Supports Full Duplex flow control (IEEE 802.3x)

1.7.2 RJ-45 Connector for Networking Interface (LAN2)

Ruby 2 also has a Realtek R8111FPV gigabit controller that interfaces to on-board RJ-45 Ethernet connector (LAN2) to provide gigabit Ethernet connections. The R8111FPV controller features;

- Integrated 10/100/1000M transceiver
- Auto-Negotiation with Next Page capability
- Supports pair swap/polarity/skew correction
- Crossover Detection & Auto-Correction
- Supports hardware ECC (Error Correction Code) function
- Supports hardware CRC (Cyclic Redundancy Check) function
- Transmit/Receive on-chip buffer support
- Supports PCI MSI (Message Signaled Interrupt) and MSI-X
- Supports power down/link down power saving/PHY disable mode
- Supports ECMA-393 ProxZzzy Standard for sleeping hosts
- Wake-On-LAN and 'RealWoW!' Technology (remote wake-up) support
- Supports 16-set 128-byte Wake-Up Frame pattern exact matching
- Supports Microsoft WPD (Wake Packet Detection)
- Supports Magic Packet Wake-Up
- Microsoft NDIS5, NDIS6 Checksum Offload (IPv4, IPv4/UDP, IPv4/TCP, IPv6/TCP, v6/UDP) and Segmentation Task-offload (Large send v1 and Large send v2) support
- Supports Full Duplex Flow Control (IEEE 802.3x)
- Supports jumbo frame to 9K bytes
- Fully compatible with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
- Supports IEEE 802.1P Layer 2 Priority Encoding
- Supports IEEE 802.1Q VLAN tagging
- Supports IEEE 802.3az-2010 (EEE)
- Supports Alert Specification Format 2.0 (ASF 2.0)
- Supports Realtek RealManage Remote Management Technology (DASH 1.1 compatible)
- Single/Dual MAC/IP support for DASH

1.7.3 Wireless Networking Interface

Ruby 2 has one M.2 key-E slot for a removable 2230 wireless module supporting a dual-banded radio with wireless and Bluetooth protocols. The radio module included with Ruby 2 is the Intel Wi-Fi 6 AX200 that features:

- 2.4Ghz and 5Ghz bands
- Maximum bandwidth of 2.4Gbps
- Supports IEEE WLAN standards IEEE 802.11a/b/d/e/g/h/i/k/n/r/u/v/w/ac/ax
- Supports authentications WPA and WPA2, 802.1X EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0-MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA')
- 64-bit and 128-bit WEP,TKIP, 128-bit AES-CCMP, 256-bit AES-GCMP encryptions supported
- Bluetooth® 5.2

2 Technical Reference

2.1 Motherboard Headers

2.1.1 Headers – Top of Board

Headers on the top side of the motherboard are defined below.

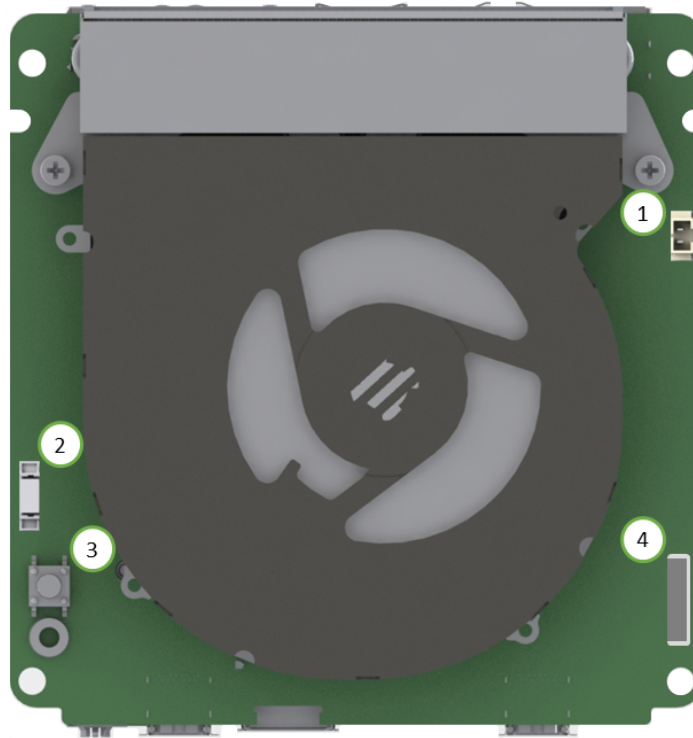


Figure 1: Top Side Header Locations

Table 3: Top Side Header Definitions

Identifier	Header
1	Battery Header
2	APU Fan Header
3	Power Button
4	eSPI Connector

2.1.1.1 Battery Header

The battery header is a 1.25mm, 1×2 2-circuit, male header. The battery header is an input power supply from a coin-cell battery to power CMOS memory.

2.1.1.2 APU Fan Header

The APU fan header is a 1.25mm, 1×4 4-circuit, male header. The header is for a CPU cooling fan that can be speed detected and controlled, as well as displayed in the Hardware Monitor section of the BIOS.

Table 4: CPU Fan Header Pinout

Pin	Signal Definition
1	GND
2	5V
3	Fan Speed
4	Fan Speed Control

2.1.1.3 Power Button

The power button on the APU side of the Ruby 2 board can be used to power on and off the system in the absence of a Power-ON solution via the Front Panel header

2.1.1.4 eSPI Connector

eSPI is an all-in-one bus that was designed to replace the LPC bus as well as the SPI bus, SMBus and side band signals.

2.1.2 Headers – Bottom of Board

Headers on the top side of the motherboard are defined below.

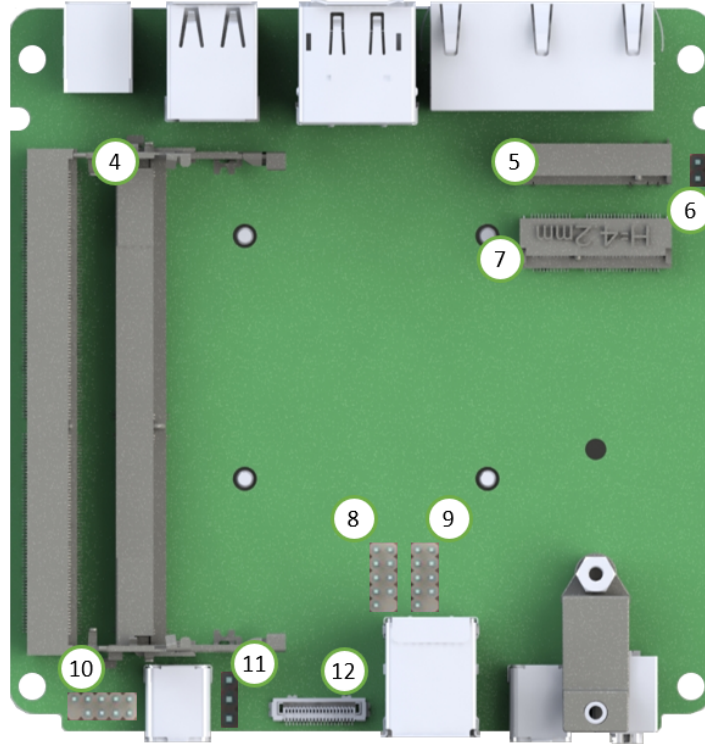


Figure 2: Bottom Side Header Locations

Table 5: Bottom-Side Header Definitions

Identifier	Header
4	DDR4 SO-DIMM Socket
5	M.2 for Storage
6	ATX/AT Jumper
7	M.2 for Radio
8	COM Header
9	USB2 Header
10	Front Panel Header
11	Clear CMOS Jumper
12	SATA-III Connector

2.1.2.1

2.1.2.2 DDR4 SO-DIMM Sockets

The Ruby 2 motherboard has two 260-pin SO-DIMM sockets for DDR4 memory and supports the following features:

- 1.2v DDR4 DIMMs with dual channel architecture
- DDR4-3200 speeds for a peak transfer rate of 25600MBps
- Non-ECC, unbuffered, single- or dual-sided SO-DIMMs
- 4GB to 64GB of total system memory
- Serial Presence Detect (SPD)
- DDR4 SDRAM organizations 1Rx8, 1Rx16 and 2Rx8 supported

2.1.2.3 M.2 for Storage

The M.2 storage socket supports both SATA III and PCI Express (PCIe) drives in a 2280 key-M module. SATA drives support a theoretical maximum transfer rate of 6Gbps, and PCIe drives utilizing PCIe Gen 4 can deliver up to 8Gbps bandwidth.

Table 6: M.2 Key-M SSD Pinout

Pin	Signal	Signal	Pin
74	3.3V	GND	75
72	3.3V	GND	73
70	3.3V	GND	71
68	SUSCLK(32kHz) (O)(0/3.3V)	PEDET (NC-PCIe/ GND - SATA)	69
66	CONNECTOR KEY	N/C	67
64	CONNECTOR KEY	CONNECTOR KEY	65
62	CONNECTOR KEY	CONNECTOR KEY	63
60	CONNECTOR KEY	CONNECTOR KEY	61
58	N/C	CONNECTOR KEY	59
56	N/C	GND	57
54	PEWAKE# (I/O)(0/3.3V) or N/C	REFCLKp	55
52	CLKREQ# (I/O)(0/3.3V) or N/C	REFCLKn	53
50	PERST# (O)(0/3.3V) or N/C	GND	51
48	N/C	PETp0/SATA-A+	49
46	N/C	PETn0/SATA-A-	47

Pin	Signal	Signal	Pin
44	N/C	GND	45
42	SMB_DATA	PERp0/SATA-B-	43
40	SMB_CLK	PERn0/SATA-B+	41
38	DEVSLP (O)	GND	39
36	N/C	PETp1	37
34	N/C	PETn1	35
32	N/C	GND	33
30	N/C	PERp1	31
28	N/C	PERn1	29
26	N/C	GND	27
24	N/C	PETp2	25
22	N/C	PETn2	23
20	N/C	GND	21
18	3.3V	PERp2	19
16	3.3V	PERn2	17
14	3.3V	GND	15
12	3.3V	PETp3	13
10	DAS/DSS# (I/O)/LED1# (I)(0/3.3V)	PETn3	11
8	USB_D-	GND	9
6	USB_D+	PERp3	7
4	3.3V	PERn3	5
2	3.3V	GND	3
		GND	1

2.1.2.4 ATX/AT Jumper

The motherboard has a 2.54mm, 1x2 jumper to select between ATX and AT mode. The default mode for the board is ATX mode with the jumper open. In AT Mode, the Restore after AC Power Loss function will enable automatically without any BIOS setting, and the system will automatically boot when power is applied. AT mode is selected if the pins are shorted together.

2.1.2.5 M.2 for Radio

The M.2 radio socket supports a wireless radio in a 2230 key-E module. The system includes an Intel WiFi 6 AX200 + Bluetooth 5.2 radio which can be removed, if necessary.

Table 7: M.2 Key-E Pinout

Pin	Signal	Signal	Pin
74	3.3V	GND	75
72	3.3V	RESERVED/REFCLKn1	73
70	UIM_POWER_SRC/GPIO1/PEWAKE1 #	RESERVED/REFCLKp1	71
68	UIM_POWER_SNK/CLKREQ1#	GND	69
66	UIM_SWP/PERST1#	RESERVED/PERn1	67
64	RESERVED	RESERVED/PERp1	65
62	ALERT# (I)(0/3.3V)	GND	63
60	I2C_CLK (O)(0/3.3V)	RESERVED/PETn1	61
58	I2C_DATA (I/O)(0/3.3V)	RESERVED/PETp1	59
56	W_DISABLE1# (O)(0/3.3V)	GND	57
54	W_DISABLE2# (O)(0/3.3V)	PEWAKE0# (I/O)(0/3.3V)	55
52	PERST0# (O)(0/3.3V)	CLKREQ0# (I/O)(0/3.3V)	53
50	SUSCLK(32kHz) (O)(0/3.3V)	GND	51
48	COEX1 (I/O)(0/1.8V)	REFCLKn0	49
46	COEX2 (I/O)(0/1.8V)	REFCLKp0	47
44	COEX3 (I/O)(0/1.8V)	GND	45
42	VENDOR DEFINED	PERn0-	43

Pin	Signal	Signal	Pin
40	VENDOR DEFINED	PERp0	41
38	VENDOR DEFINED	GND	39
36	UART CTS (O)(0/1.8V)	PETn0	37
34	UART RTS (I)(0/1.8V)	PETp0	35
32	UART RXD (O)(0/1.8V)	GND	33
30	CONNECTOR KEY	CONNECTOR KEY	31
28	CONNECTOR KEY	CONNECTOR KEY	29
26	CONNECTOR KEY	CONNECTOR KEY	27
24	CONNECTOR KEY	CONNECTOR KEY	25
22	UART TXD (I)(0/1.8V)	SDIO RESET# (O)(0/1.8V)	23
20	UART WAKE# (I)(0/3.3V)	SDIO WAKE# (I)(0/1.8V)	21
18	GND	SDIO DATA3(I/O)(0/1.8V)	19
16	LED2# (I)(OD)	SDIO DATA2(I/O)(0/1.8V)	17
14	PCM_IN/I2S SD_IN (I)(0/1.8V)	SDIO DATA1(I/O)(0/1.8V)	15
12	PCM_OUT/I2S SD_OUT (O)(0/1.8V)	SDIO DATA0(I/O)(0/1.8V)	13
10	PCM_SYNC/I2S WS (O/I)(0/1.8V)	SDIO CMD(I/O)(0/1.8V)	11
8	PCM_CLK/I2S SCK (O/I)(0/1.8V)	SDIO CLK(O)(0/1.8V)	9
6	LED1# (I)(OD)	GND	7
4	3.3V	USB_D-	5
2	3.3V	USB_D+	3
		GND	1

○

2.1.2.6 COM Header

The COM header is a 2.00mm, 2x5 9-circuit, male header. This header is intended to connect to a serial RS-232, RS-422 or RS-485 interface.

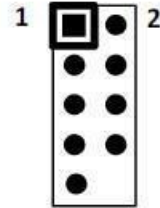


Figure 3: COM Header

Table 8: COM Header Pinout

Pin	RS-232 Signal	RS-422 Signal	RS-485 Signal
1	DCD	TX-	RTX-
2	RXD	TX+	RTX+
3	TXD	RX+	N/A
4	DTR	RX-	N/A
5	GND	GND	GND
6	DSR	N/A	N/A
7	RTS	N/A	N/A
8	CTS	N/A	N/A
9	RI#	N/A	N/A
10	Empty	Empty	Empty

○

2.1.2.7 USB 2.0 Header

The motherboard has one on-board 2.00mm, 2x5 9-circuit, male header that can be used to connect to two external USB 2.0 devices.

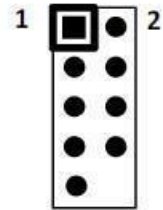


Figure 4: USB 2.0 Header

Table 9: USB 2.0 Header Pinout

Pin	Signal
1	VCC
2	VCC
3	USB0-
4	USB1-
5	USB0+
6	USB1+
7	GND
8	GND
9	No Connect
10	Empty

○

2.1.2.8 Front Panel Header

The front panel header is a 2.00mm, 2x5 9-circuit, male header. It connects to the front panel switches and LEDs.

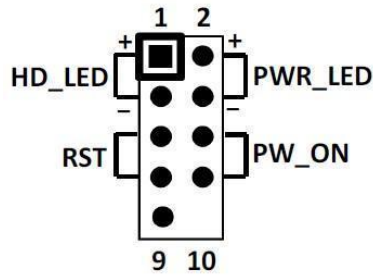


Figure 5: Front Panel Header

Table 10: Front Panel Header Pinout

Pin	Header	Signal
1	HD_LED	HD_PWR
3		HD_Active
2	PWR_LED	PWR LED+
4		PWR LED-
5	RESET	GND
7		RST BTN
6	PW_ON	PWR BTN
8		GND
9	No Connect	+5V
10	Empty	Empty

The HD_LED pins attach to a hard disk drive indicator LED to show the activity status of the hard disks. The Power LED lit by the PWR_LED pins indicates the status of the system.

Table 11: Power LED System Status

System Status	Power LED status
S0	LED is on
S1	LED will blink
S3	LED is off
S4	LED is off
S5	LED is off

The RESET pins attach to a front panel RESET switch to restart the system when the switch is pressed. The PW_ON pins attach to the front panel Power switch to turn the system on and off when the switch is pressed.

2.1.2.9 Clear CMOS Jumper

The motherboard has a 2.54mm, 1x3 3-circuit, male header for a 2-pin jumper that can be used to clear the CMOS data and reconfigure the system back to the default values stored in the ROM BIOS.

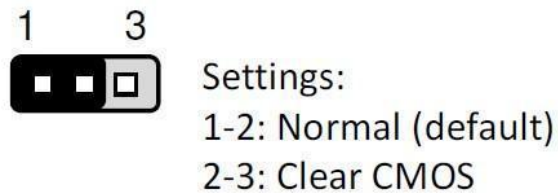


Figure 6: CMOS Header Settings

To clear the CMOS,

1. Turn off the system. Disconnect power to the unit.
2. Move the jumper from the “1-2” position to the “2-3” position for a few seconds.
3. Replace the jumper back to the “1-2” position.
4. Reconnect power to the unit, turn on the system and hold down the <DELETE> key to enter the BIOS setup.

2.1.2.10 SATA-III Connector

The motherboard has a 0.5mm 20-pin WTB LVDS connector with which to attach a SATA-III storage device.



Figure 7: SATA Connector

Table 12: SATA Connector Pinout

Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	GND
6	RX-
7	RX+
8	GND
9	GND
10	GND
11	No Connect
12	5V
13	5V
14	5V
15	5V
16	5V
17	No Connect
18	GND
19	GND
20	GND

2.2 Chassis I/O Connectors

2.2.1 Connectors - Front Panel

Front-side connector locations are shown below.

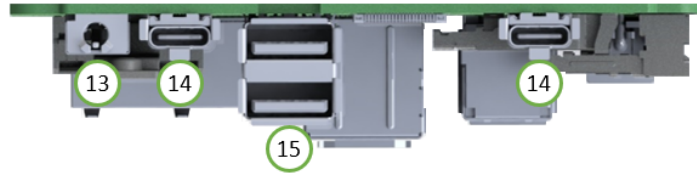


Figure 8: Front Side Connector Locations

Table 13: Front Side Connections Defined

Identifier	Connector
13	Audio Jack
14	Dual USB 3.2 Gen2 Type-C
15	Dual USB 3.2 Gen2 Type-A

The 3.5mm audio jack supports two-channel high-definition audio output and a microphone input in both TRRS (CTIA/AHJ and OMTP) standards. The TRRS standard used is auto-detectable by the hardware.

The two USB 3.2 Gen2 Type-A and Type-C ports on the front of the board support transfer speeds up to 10Gbps. The dual Type-C ports also support DP 1.2a via DP Alt Mode to display output with a maximum output resolution of 4096 x 2160, 60Hz.

2.2.2 Connectors - Rear Panel

Connector locations shown on the back side of the motherboard are shown below.

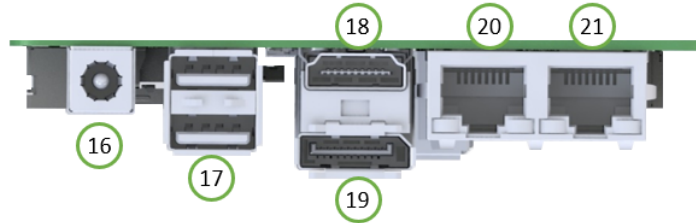


Figure 9: Back Side Connector Locations

Table 14: Back Side Connections Defined

Identifier	Connector
16	DC Power Input
17	Dual USB 2.0 Type-A
18	HDMI Port
19	DisplayPort
20	RJ-45 for Gigabit Ethernet (LAN2)
21	RJ-45 for 2.5 Gigabit Ethernet (LAN1)

The system has a 12-19VDC input with 10% +/- tolerance.

The two USB 2.0 Type-A ports support transfer speed up to 480Mbps.

The HDMI 2.0a port can support a maximum output resolution 4096 x 2160, 60Hz.

The DisplayPort 1.2a port can support a maximum output resolution of 4096 x 2160, 60Hz.

The on-board RJ-45 gigabit Ethernet port is controlled by a Realtek R8111FPV gigabit controller. For more information on the controller refer to RJ-45 Connector for Networking Interface (LAN2).

The on-board RJ-45 2.5 gigabit Ethernet port is controlled by a Realtek RTL8125BG gigabit controller. For more information on the controller refer to RJ-45 Connector for Networking Interface (LAN1).

2.3 Mechanical Dimensions

2.3.1 PCB Chassis Mount

The dimensions for the PCB to securely mount into a chassis are given in Figure 10.

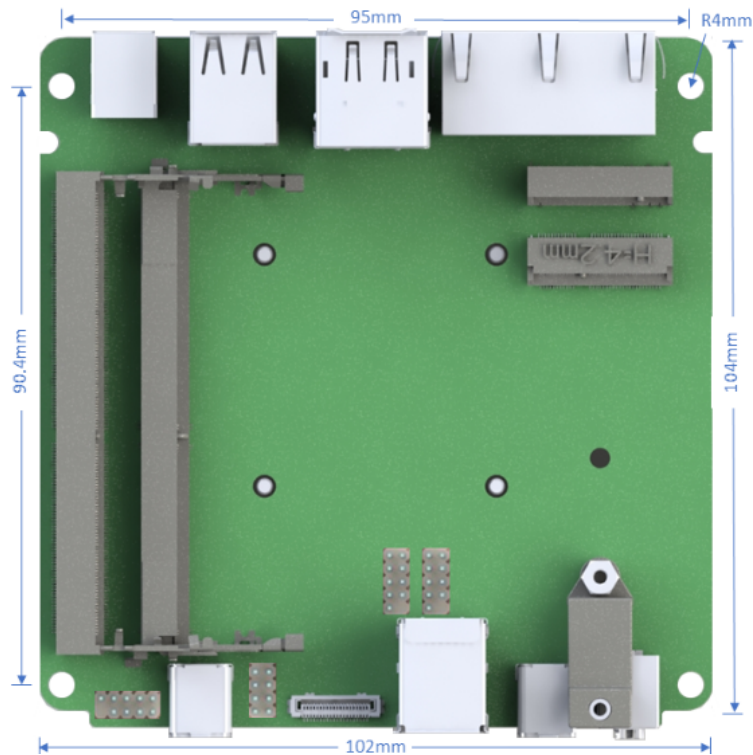


Figure 10: Motherboard Dimensions

2.3.2 System Height

The maximum height of a populated system is shown below.

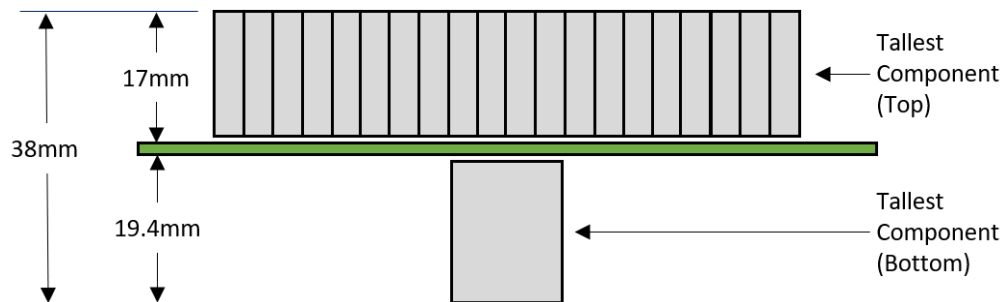


Figure 11: System Height

3 Environmental Specifications

Table 15: Environmental Specifications

Condition	Specification
Input Voltage	12V – 19V ±10%
Input Voltage Connector	5.5 x 2.5mm Barrel Plug
Recommended PSU Wattage	90W
Operating Temperature	0°C– 60°C
Operating Humidity	5% – 90%
Storage Temperature	-40°C – 85°C
Storage Humidity	5% – 90%

4 Version History

Version	Date	Comments
0.1	05/08/2022	<i>Copied from Ruby. Updated APU and GPU tables.</i>
0.2	05/12/2022	<i>Updated ToC, Tables and Figures contents</i>
0.9	05/24/2022	<i>Still need: Vin tolerance</i>
1.1	07/20/22	<i>revised system images and , re-formatted document</i>
1.2	7/20/2022	<i>Updated M.2 from PCIe Gen 3 to 4 (2.1.2.3) Updated M.2 bandwidth (2.1.2.3)</i>

*** * * END OF DOCUMENT * * ***